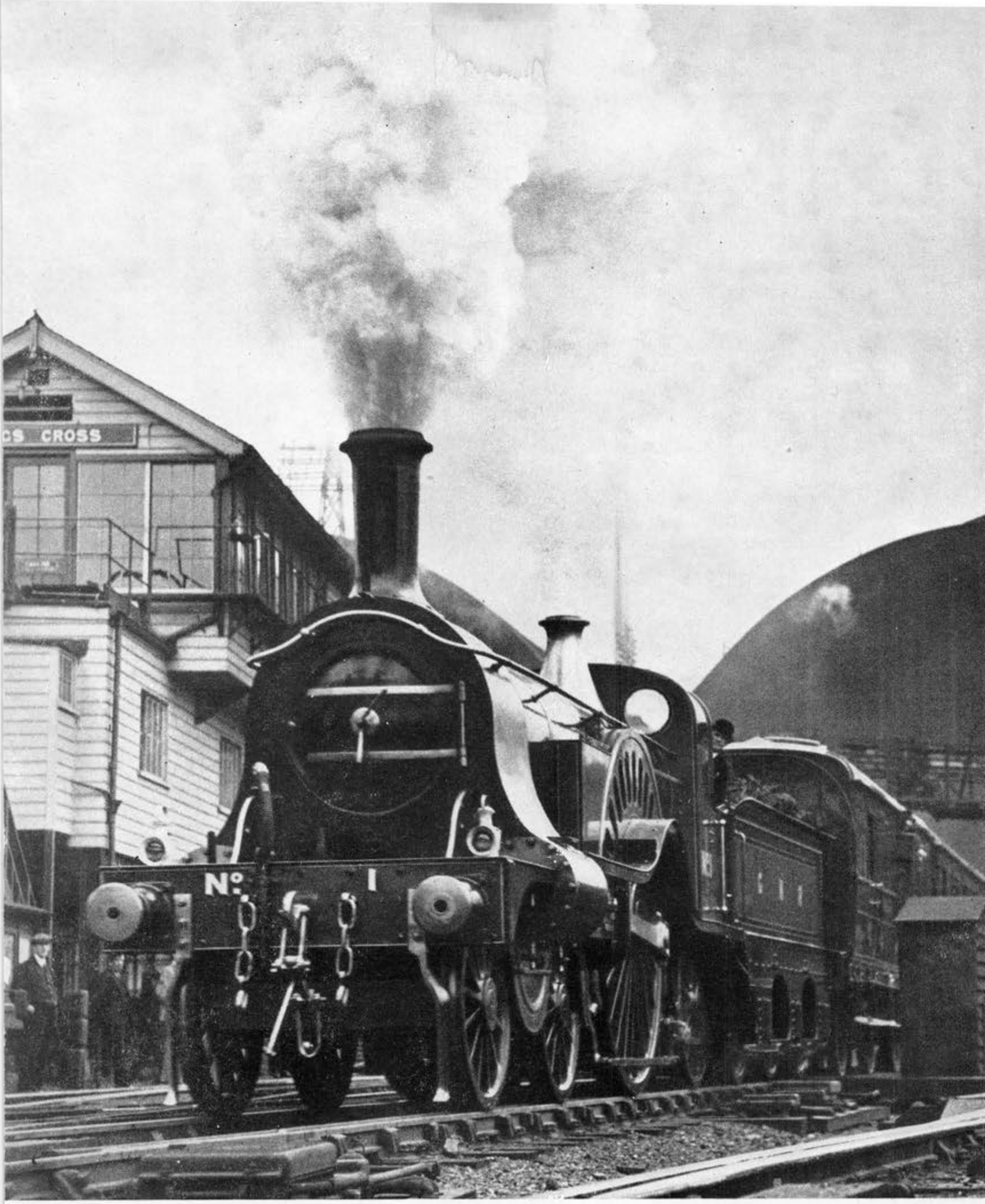
LOCOMOTIVES WORTH MODELLING



The original " Flying Scotsman " train leaving King's Cross in June, 1938 pulled by the famous Stirling single-wheeler, No. 1, to celebrate the Jubilee of the railway race to Edinburgh in 1888. The locomotive was brought from York Museum and the coaches collected from all over the country for the occasion.

LOCOMOTIVES WORTH MODELLING

by

F. C. HAMBLETON

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CONTENTS

PAGE

i. HEROES OF THE PARIS EXHIBITION OF 1889 1

ii. THE LATER MIDLAND RAILWAY SINGLES 25

iii. A G.W.R. CONTEST 32

iv. THE L.N.W.R. *Precedents* AND THEIR PILOTS 40

v. THREE AND FOUR CYLINDER COMPOUNDS OF THE L.N.W.R. 57

vi. A NOBLE DESCENDANT OF THE CREWE TRADITION 71

vii. GOODS ENGINES WITH A COMMON ANCESTRY 78

viii. MIDLAND RAILWAY NO. 1447 85

ix. L.B. & S.C. RAILWAY "VULCAN" GOODS ENGINES ... 91

x. A SPLENDID GATESHEAD GIANT 98

xi. STRATFORD BEAUTIES 105

xii. ENGINES BUILT IN LONDON 114

xiii. LONDON & SOUTH WESTERN RAILWAY, NO. 591 125

xiv. L.C.D. RAILWAY, NO. 145 139

xv. THE FAMOUS GREAT NORTHERN NUMBER ONE 144

xvi. M.S. & L. RAILWAY, NO. 694 157

xvii. TWO CHARMING LITTLE SHUNTING ENGINES 164

All illustrations to the text by the author, cover by E. B. Mudge Marriott.

CHAPTER I

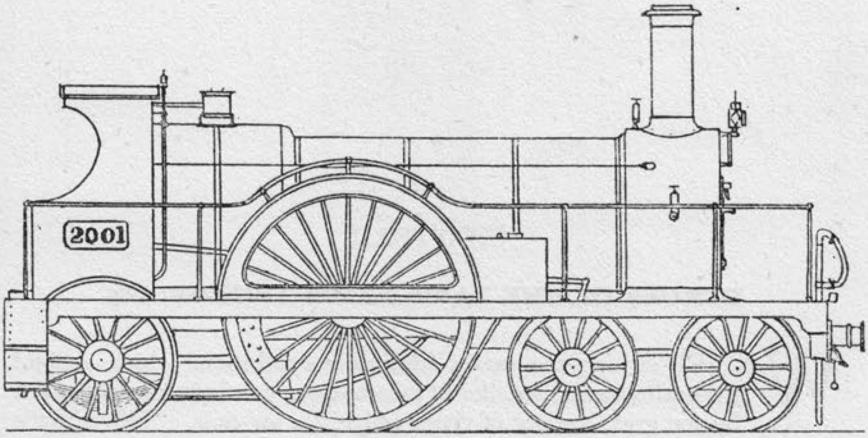
HEROES OF THE PARIS EXHIBITION OF 1889

WHILST visiting the many admirable exhibitions which delight the enthusiastic modeller of locomotives, one is frequently struck by the great variety of types which are on view. " What made that fellow chose that particular engine ? " is a question which often occurs to the mind. Yes, indeed, and one realises that there may perhaps have been quite a wealth of romance connected with the choice ! Admiration of outward appearance might be placed first amongst the reasons, followed by the memory of a notable performance on some particular occasion. Or, it might well have been that a certain engine had become an old familiar friend (locomotives are very human, you know), or a well-enjoyed and never-to-be-forgotten holiday had begun with a journey behind " dear old No. 189."

There could be other reasons, of course. A devotee of some railway might be building up a comprehensive collection of types belonging to his favourite line, or a historical series might be contemplated. One thing is certain—in spite of the splendid model work of the past, a wealth of locomotive design, both old and new, still awaits the attention of the enthusiast. Where to begin ? Ah ! yes, where to begin. Well, let us take a peep into one of the most interesting bits of locomotive history I know.

The Paris Exhibition of 1889 caused no small stir in the locomotive world. The continental builders seized this opportunity of publicity by exhibiting a considerable number of engines of various types, and even three of the English companies considered it worth while to go to the expense of sending examples of their workmanship across the Channel. Only one major line thus indulged, the Midland Railway dispatching a brand new single-wheeler, No. 1853. The other two entrants belonged, rather naturally, to the railways directly concerned with the cross-Channel continental traffic.

The South Eastern Company contributed their new Stirling 4-4-0, No. 240, *Onward*, whilst the London, Brighton and South Coast Railway, mindful of the effect a gorgeous yellow engine would make on visitors to the great Exhibition, selected the latest example of the already famous



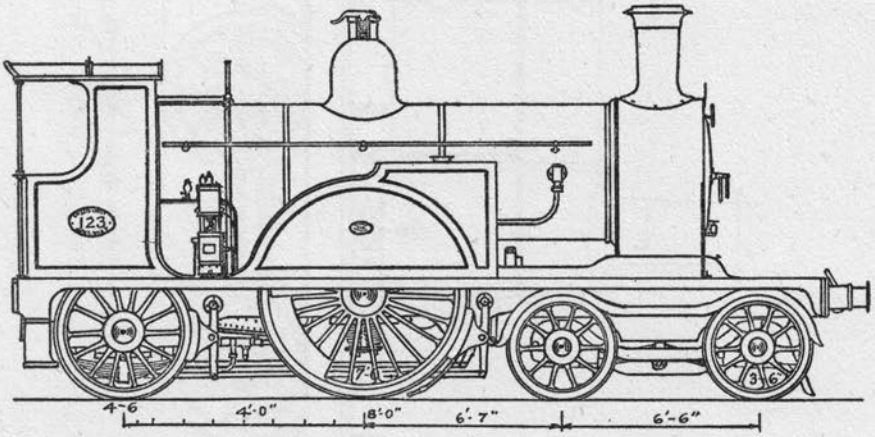
A sketch of the first 4-2-2 *inside cylinder locomotive. With* 8 *ft. wheels these G.W.R. rebuilds took a big share in the express work of* 1872.

Gladstone class, No. 189, *Edward Blount*, appropriately named after the chairman of the Western Railway of France.

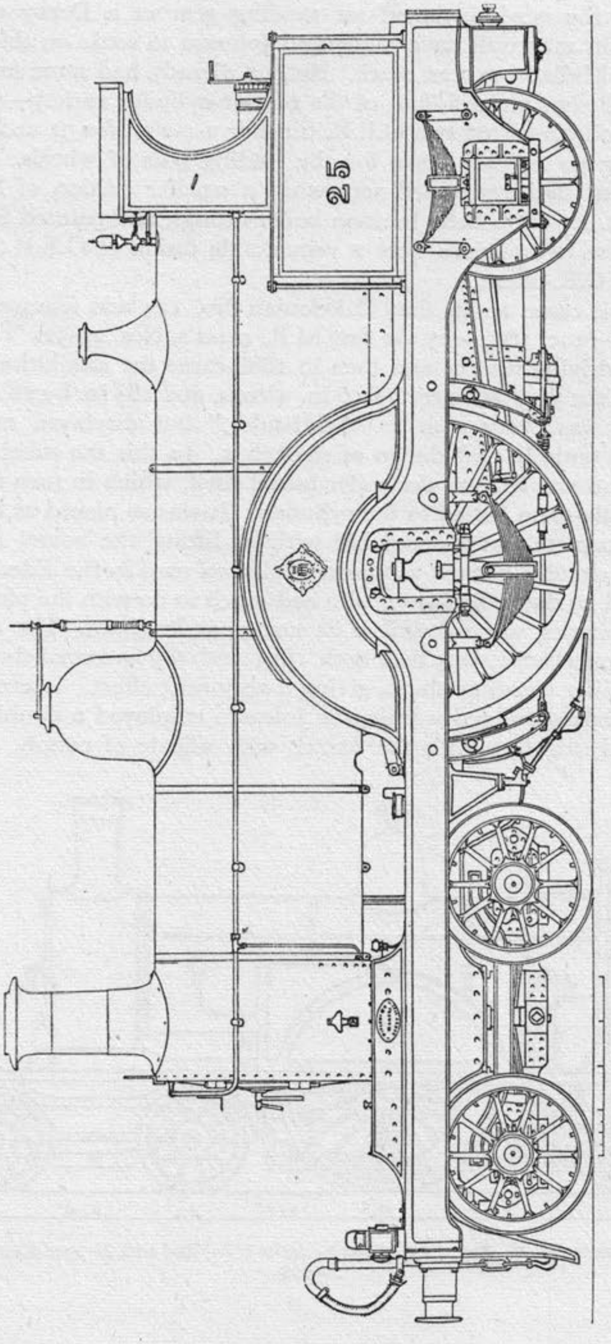
The engine that carried off the senior award—the Grand Prix—was the M.R. Johnson 7 ft. 6 in. single-wheeler, No. 1853. With her superb finish, and coupled to a wonderful twelve-wheeled Midland Railway coach, she entirely won the hearts of all beholders. Strangely enough, she was linked up in a number of ways with the L.B.S.C. exhibit, *Edward Blount*.

To begin with, both designers had been associated in days past on the old Edinburgh and Glasgow Railway, when in 1864-65 Stroudley had been works manager to Samuel Johnson at Cowlairs. Again, in 1874, Stroudley's chief draughtsman, Robert Billinton, had left Brighton, after seeing the completion of the grand 6 ft. 9 in. *Grosvenor*, to serve under Johnson at Derby, rising to position of chief draughtsman there. When Billinton again went south to succeed his former chief, Stroudley, his own engines bore the characteristics of both the famous engineers. There had been but few inside-cylindered engines of the 4-2-2 type before the advent of M.R. No. 1853. The first ones had been rebuilds of old Bristol and Exeter tank engines. These were the No. 2001 broad-gauge G.W.R. class, eight-footers with 18 in. by 24 in. cylinders, that took their share of the express work with the famous Gooch singles, although not so highly regarded by the men as the latter. They appeared in 1877. Eight years later Beyer Peacock built some 4-2-2's for the Irish G.N.R., and then in 1886, Neilsons designed and built the wonderful Caledonian Railway No. 123. The astounding performances of this seven-footer, aided, no doubt, by the newly-invented air sanding gear of a Derby engineer, Mr. F. Holt, may well have influenced Johnson to settle on this type of engine for Midland express work. He had already had some experience of such a design himself—but of the outside-cylinder variety—when, in 1872, he had converted two G.E.R. Sinclair 2-2-2's, Nos 51 and 291, by substituting an Adam's bogie for the leading pair of wheels. In their altered form they resembled somewhat a smaller edition of Stirling's G.N.R. No. 1. With their Johnson boiler fittings, and painted Stroudley yellow, these two engines were a remarkable fusion of G.E.R., G.N.R. and L.B.S.C.R. ideas!

Hence it came about that Caledonian No. 123 was followed in the next year—June, 1887—by the first M.R. 4-2-2's, Nos. 25-32. These had 7 ft. 4 in. driving wheels, and then in 1888 came the Exhibition engine, 1853, with the slightly larger 7 ft. 6 in. wheels, and 18½ in. by 26 in. cylinders. She was every inch a "Midlander," but displayed one novel feature, an entirely new design of smokebox. In this the tubeplate was circular, and was let into the boiler barrel itself, which in turn rested on a steel saddle-plate bolted to the cylinders. It was so placed as to render all the tubeplate rivets accessible without lifting the barrel from the saddle. A circular flanged tubeplate had been used in the *Edward Blount* design, and no doubt Billinton, who had much to do with the planning of the M.R. singles, was mindful of its success at Brighton. The result, in outward appearance, was that both 1853 and 189 had smokeboxes flush with the boiler cleading plates, giving a very neat effect. Internally, the two smokeboxes differed a little, for Johnson employed a double-walled one, lagged, together with the barrel, with silicate of cotton. A novel



The famous Caledonian No. 123, the first single-wheeler to be fitted with air sand-blast, to prevent slipping.

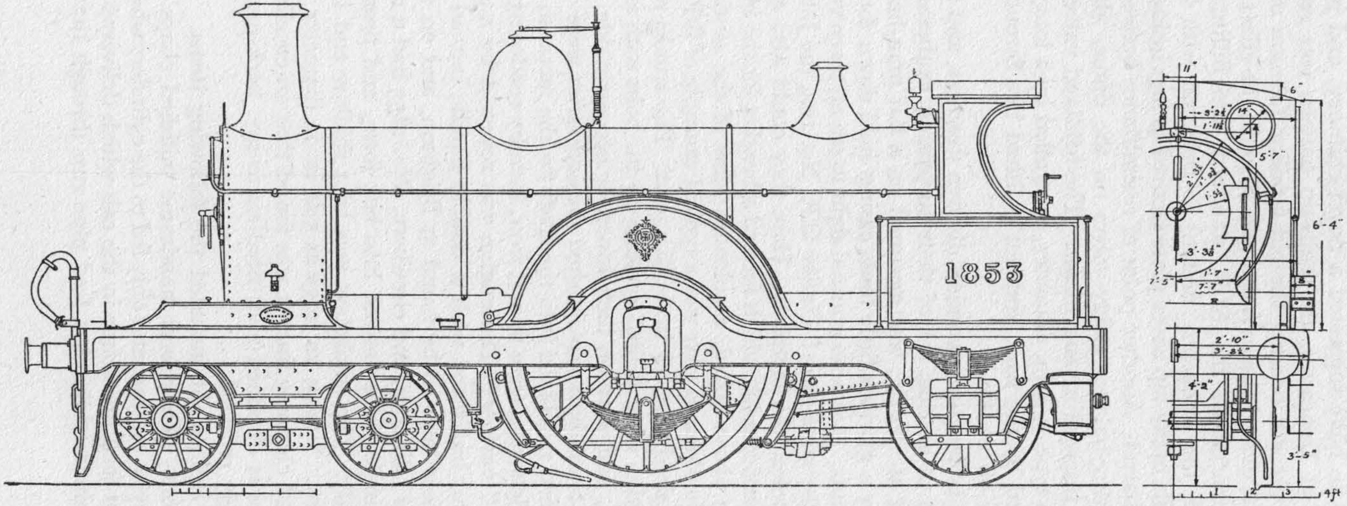


The first of the Johnson singles—Nos. 25-32, 37 and 1854-62, were the eighteen of the 7 ft. 4 in. class built in 1887-89.

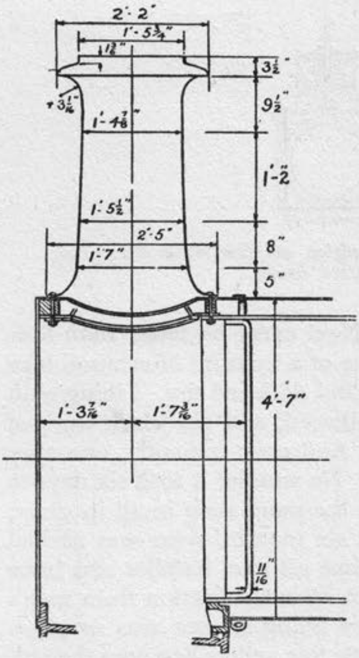
smokebox seems to have suggested a novel chimney, and just as in the case of Stirling at Doncaster, the built-up pattern was replaced by a smooth casting, yet still bearing the old familiar Johnson outline. Both designer and chief draughtsman must have thought the effect mighty fine, for it became henceforth the M.R. standard, and Billinton also took it (together with the smokebox design) to Brighton with him, slightly refining the profile of the top cover plate secured to lugs inside the bell-top of the chimney barrel. Another point of resemblance between 1853 and 189 was the spring-balance safety-valves on the dome, although they differed also in internal arrangements. The Midland valves were of the usual mushroom type, $3\frac{7}{16}$ in. diameter, controlled by a long 1 ft. $10\frac{3}{8}$ in. lever, painted red by the way, and not polished like Stroudley's. They were set to blow off at 160 lb.

The Johnson boilers were wonderfully free steamers, and to give them an extra chance of getting rid of their surprising exuberance a direct loaded valve, set at 162 lb., was mounted on a flat man-hole plate, the whole covered by a glorious little brass casing held down fore and aft by neat hexagonal nuts. It was no unusual sight to see all three valves merrily fizzing away at the same time! Unlike C.R. No. 123, the Johnson engine had sandboxes below the footplate. Here they could also act as frame-stays, and they carried a lug which formed a bracket for the brake hanger. In their absence above-board, a splendid view of the motion could be obtained. The Stephenson gear was a typical example of British practice, fitted with good-sized pins, $1\frac{3}{4}$ in. in diameter. The cranks were hooped, and both crankpins were drilled to take $2\frac{1}{2}$ in. bolts with an hexagonal head at one end, and were on their inner, or eccentric side, well riveted over. After the crankshaft was finished the eccentrics were cast on to it, four slots being first machined into the shaft for the metal to fill and grip on. The eccentric-straps were of cast iron, thereby rendering them of the "fit and forget" variety! The engine was reversed by a screw of the Stroudley pattern, but fitted with a double handle instead of a wheel. Such a pattern was later to be found at Brighton, and on the G.W.R., Dean's *Lord of the Isles* class, and elsewhere. No. 1853 had a novel ashpan made out of a single sheet flanged into box form, and provided with a front damper only. The smokebox was kept shallow and the blastpipe orifice placed low. It was as large as $5\frac{7}{16}$ in. in diameter, but with a petticoat pipe and chimney liner it was found that an excellent equalisation of draught was obtained and, needless to say, back-pressure on the pistons was largely reduced.

The general equipment included the following items. A couple of Furness lubricators. (They were handsome polished chaps with a very Midland-chimneyish outline, and only fed to the cylinders when steam was shut off.) A sight-feed lubricator in the cab which delivered oil at about two drops per minute through a feed pipe run through the handrail on


1853
11"
6"
3'-2¼"
1'-11½"
14"
5'-7"
2'-3½"
1'-9½"
1'-5½"
6'-4"
3'-3⅛"
1'-7"
7'-5"
7'-7"
8"
2'-10"
3'-8½"
4'-2"
3'-5"
1
2
3
4ft

The Exhibition engine had much the same dimensions as No. 25, *but cylinders and the* 7 *ft.* 6 *in. driving wheels were larger. Later on rear sandboxes were fitted. Standard M.R. smokebox, cab and buffer beam are features of the front elevation of No.* 1853.

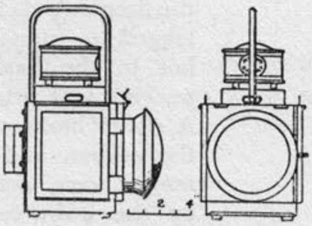


Standard M.R. chimney casting and double smokebox with circular tube-plate.

the fireman's (L.H.) side The rail was lagged to prevent it becoming too hot to the hands. Simple metallic packing was fitted to the piston-rods. A steam brake with a cylinder below the ashpan and another one on the tender were actuated simultaneously by the train vacuum brake handle, the large ejector was placed close to the smokebox on the right-hand side, whilst the small ejector also functioned as a blower. The larger brass whistle was a good-looking affair with a bell, 4¾ in. by 3⅝ in. diameter (still largely in use, by the way) and its companion was a tiny little fellow, only 3¼ in. by 1½ in., but which squealed right lustily when anyone in distress pulled the communication cord ! Two Gresham injectors on the firebox front were very accessible, as were the two convenient toolboxes. The regulator handle was a long 18 in. one, elegant in shape, and the firedoor was given louvres, so angled that when shut not a trace of glare was present, and when opened only a slight reflection from the fire was thrown downwards on to the floor.

There was a fair amount of glitter-work about the engine, for in addition to the two whistles, the casings of the safety-valve springs and the rims of the 14 in. cab windows, there were the 6½ in. brass numerals (perhaps the tallest in use at that period), the 2 in. polished rim round the big splasher, the truly wonderful driving wheel axlebox with its four attendant lubricators, together with the polished brass handles and lens-rims of the head-lamps, and the polished steel top plates of the two rear, and six tender axleboxes.

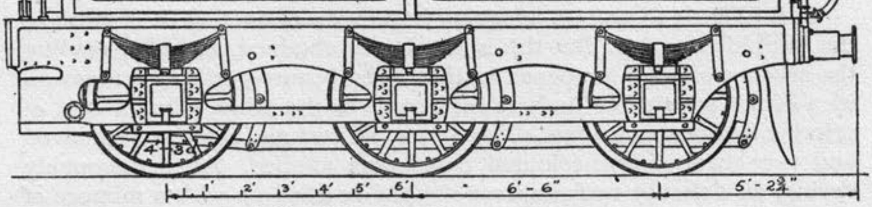
It is difficult to give an adequate impression of the degree of finish of the exhibition engine. But this is how it was obtained, and after reading the account of what happened in the Derby beauty-parlour, perhaps an idea of her mirror-like surfaces may come to the mind. First a coat of priming before steam trials. These over, all rust and scale was removed and two coats of lead-coloured paint were applied. After thoroughly drying, all defective surfaces were stopped or filled up with a mixture of gold size and dry white lead. These were then rubbed down with pumice



The Midland lamps were engine-red with black edging and fine yellow line. Note the brass lens ring and polished handle.

and water to a perfectly smooth finish. Next came no fewer than four coats of purple or chocolate, and lastly one of a mixture of crimson lake and purple brown to give the famous Midland dark red tint. Lining with black edging and its thin yellow stripe followed, and the black work of platforms, brake-gear, etc., was finished. And now, patiently, one after the other, came five coats of best varnish ! No wonder it took six days to get over all this ! The engine proudly left the paint shop in all its glory, though personally, I always thought that six months' wear was needed before perfection was obtained. In that time all steel handles and brass work got that lovely glow that comes from repeated friction from men's hands, or from rag and metal polish. The lining scheme was simple—just a small black border with an inner single fine yellow line next the red.

This was placed on cab side-sheets and front sheet, round the windows, at the base of the dome, lagging belts, driving splasher, round edge of dark red main frame standing above footplate under the smokebox, along outside frames and steps, round the red guardirons, round the dark red sandboxes, driving horns, and round the other eight axleboxes. Tyres



Tender of No. 1863 *and* 115. *Many are still in use today.*

black with one yellow line, bogie hubs red with two yellow circles, and little vees top and bottom of spokes.

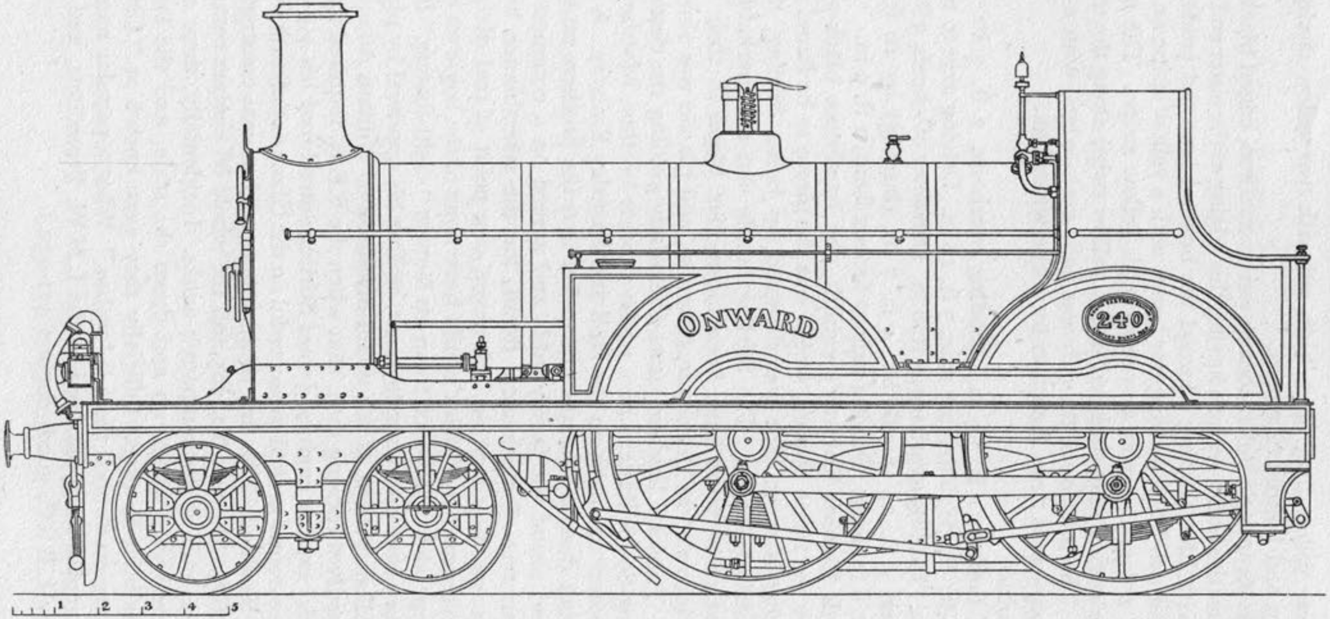
The buffer-beam and buffer-sockets were vermilion, edged black, with fine white line (the buffer-sockets having this edging at the outer end only). Gilt letters with blue shading adorned the buffer-beam and tender side. The latter had two black rectangular bands with a yellow stripe on either side, and its red coping was also lined with yellow stripe. The outside springs of the engine were dark red with a yellow stripe along the top and bottom leaf. The interior of the cab was light grain edged with a broad black band separated from the grain by a fine white line.

Useful Dimensions

Length of buffers, 1 ft. 5½ in. Leading overhang, 2 ft. 3 in. Bogie wheelbase, 6 ft. Bogie to driving axle, 7 ft. 1½ in. Driving axle to trailing axle, 8 ft. 9 in. Trailing overhang, 3 ft. 8 in. Diameter of wheels, 3 ft. 6 in., 7 ft. 6 in. and 4 ft. 2½ in. Boiler, 4 ft. 7 in. (lagging) by 10 ft. 4 in. Firebox, 6 ft. 6 in. long. Driving axle to firebox front, 1 ft. 9 in.

The South Eastern Railway's exhibit, the handsome black-painted No. 240, bore the name *Onward*, which was the motto to be found on the company's coat-of-arms. She was designed by James Stirling, then in charge at Ashford Works. The Stirling family was a remarkable one. It seems that there must have been locomotive blood in their veins! Brother Patrick ruled at Doncaster, of course, and his son was also in the works there. Patrick's brother James was wisely guiding the destinies of the interesting South Eastern line, whilst another brother, Matthew, was likewise in power up north on the Hull and Barnsley Railway. A glance at their various designs prompts one to feel that the brothers must have often gathered round the family table and agreed on a common policy as regards matters of mechanical detail, for the resemblance between their engines was most striking. However, one point of real divergence appeared. Whereas Mr. Patrick would have none of the bogie on express engines, except when compelled to on his famous "eight-footers," Brother James was very keen on its employment, sealing his approval by planning his own excellent version of this useful invention of William Adams.

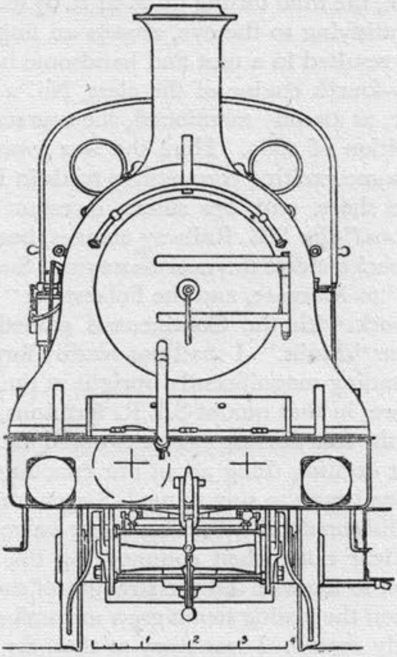
It was hardly surprising then, that when the S.E.R. required new and more powerful express engines, James Stirling introduced his 4-4-0 type, which had previously proved so successful on the Glasgow & South Western Railway, in Scotland. The first of these new engines was constructed at Ashford in 1883. She was No. 205 and the whole 88 engines comprising the class were built at the company's works. Incidentally, these engines were numbered very much up and down the scale, and the last one, No. 233, was built in 1898. Officially they were known as "Class F," but the enginemen dubbed them "Jumbos." What a popular name that was! (One recalls its application to the L.N.W. Precedents, and to the big Stroudley L.B.S.C. goods engines 421-432.)


ONWARD
240
1
2
3
4
5

No. 240 *was a noble representative of English design at the Paris Exhibition of* 1889.

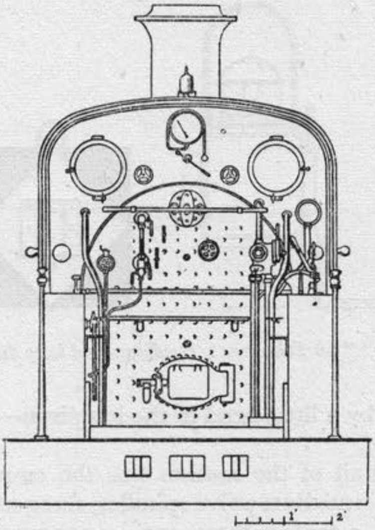
Characteristically, they had large 7 ft. driving wheels and big 19 in. by 26 in. cylinders, supplied by a smallish boiler, 4 ft. 4 in. diameter by 10 ft. 4½ in. in length, and a short 5 ft. 9 in. firebox pressed to 150 lb. The centre-line of the boiler stood at 7 ft. 5 in. and the shapely chimney towered up to 13 ft. 4 in.—a very generous loading gauge indeed. The spacing of the wheelbase was interesting ; only 5 ft. 4 in. between the large 3 ft. 9 in. bogie wheels, but the driving wheels were spread out to as much as 8 ft. 6 in., the total totting up to 21 ft. 0¾ in. These proportions were particularly satisfying to the eye, always an important point to the loco-modeller, and resulted in a taut and handsome balance to the whole engine. The thirty-fourth engine of the class, No. 240, was destined to become famous, for, as already mentioned, she was sent when brand new to the Paris Exhibition of 1889. Here she was awarded a gold medal, and after running some exciting competitive trials in France, returned to her native shore to share, with her sisters, incessant railway toil. Like the L.N.W. "Jumbos," the S.E. Railway engines, bearing the same nickname, formed the backbone of the express service. Such celebrated trains as the " Granville " to Margate, and the Folkestone " Tidal " fell to their lot, whilst their work with the Continentals gained them yet a third *soubriquet*, that of the " Mails." I shall not readily forget my first impressions of No. 240 standing magnificently upright in the little old Ramsgate Town station. There, in that quaint S.E.R. terminus, the platforms were distinctly low and the fine Stirling engine towered above its very youthful admirer. The most exciting thing about our encounter was the fact that the celebrated engine began to sing to me ! Sing to me ? Yes, indeed, for one of the accomplishments of a Stirling safety-valve was that of gently humming a nice clear note when commencing the blowing-off antics. As the pressure rose, so likewise did the strength of the sound, until there came a moment when the hissing steam grew uncomfortably loud, and the vocal effort suddenly ceased. I was sorry at that, for I liked my engines to sing to me, and felt a little anxious—not to say nervous—when a fearsome column of white steam roared from the valve.

Ramsgate, in those days, was a land of locomotives painted in black. Down at the Harbour station were those nice old Kirtley " Chatham and Dover " engines, looking over the turntable wall at the winkle-barrows and the wind-jammers, whilst up at the Town terminus stood S.E.R. No. 240, also decked out in black relieved by three red lines and a yellow one. These were arranged on this wise : first came an outer fine red line, inside this were the other two red lines, forming as it were, a narrow panel in which was placed the yellow stripe. Viewed from the front, the eye moved from the red buffer-beam (edged with black border and fine inner white line) up to the handsome " wing " front plate of the smokebox. This was a very elegant affair and set off the engine admirably. Dean, Drummond and McIntosh favoured this adornment, it may be recalled, and I always felt that the G.W.R. " Barnums "—those handsome 2-4-0's—the L.S.W. 708 class, and the " Dunalastairs," owed much of their good looks to this particular feature. Domes, of course, were always objects of great interest, but a " straight-back " also had its charms, and the placing of my tenor singer (*alias* safety-valve), with its black-painted cover—it was many years before this feature was polished up bright—made an interesting " top-side " to the engine.



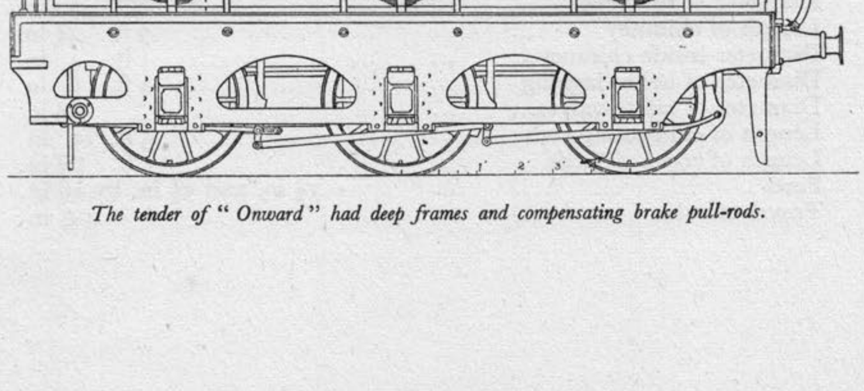
A finely designed wing plate was a feature of " Onward."

The long cylindrical chimney was a novelty, for not many parallel-sided funnels could be seen, but it was what the modern schoolboy would term a " smasher." A strong family resemblance to the G.N.R. pattern could be felt, and somehow it looked " just right " on every type of S.E.R. engine. In particular it suited the old Cudworth engines, converting these excellent but slender-looking locomotives into sturdy fellows. And it suited No. 240 to perfection. The little 12 in. windows in the lovely round-topped cab were most attractive, not to mention the whistle perched up aloft, and the fascinating rake, at all sorts of funny angles, of the brake pull-rods. The tender was grand, with its " above footplate " springs and deep framing, and, indeed one fell in love with the whole engine the instant one clapped eyes on her.

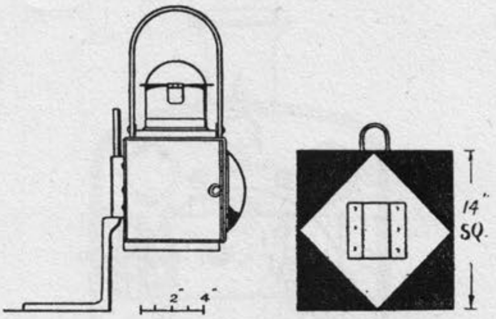


Compare this layout with that of G.N.R. No. 1.

What a wonderful headboard was placed at the top of the smokebox when running express trains! A great square white thing it was, with black corners. To keep it company, two red-painted headlamps were slipped on to the lampirons. They were nice big comfy-looking objects with the unusual feature of a hinged wire handle. They were kept high



The tender of "Onward" had deep frames and compensating brake pull-rods.



"Right-away!" for Folkestone! Headboard and lamp displayed on this route.

above the footplate by a little bend in the lampiron—a very sound design, and simplicity itself.

The one big detail of the motion was the employment of the old-fashioned jointed intermediate valve spindles, slung at the outer ends from vertical swing links, a feature these engines carry to this day. I wonder how you like the cab arrangement? It was a nice-looking scheme, with, of course, the family flavour, and popular with the men. Personally, I cannot recall ever seeing a model of No. 240, which is strange, because apart from good looks, she had a kind of bounding-along appearance when running—most attractive.

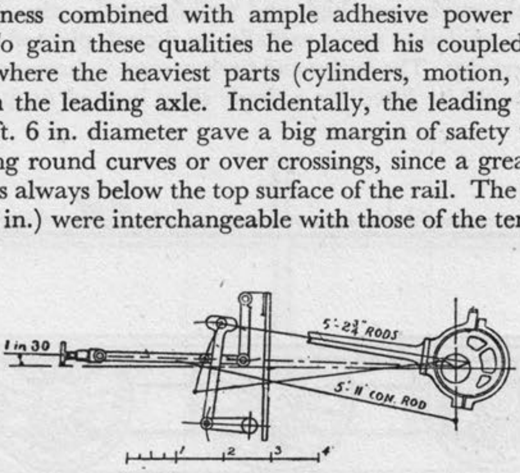
The Southern Railway has always regarded these engines highly for they have been kept well up to date, and had to work hard for a living. But you can't see their good looks nowadays. No, one would have to shunt back to the 1890's to do that. It would be fun, wouldn't it?

Useful Dimensions of "Onward" 240

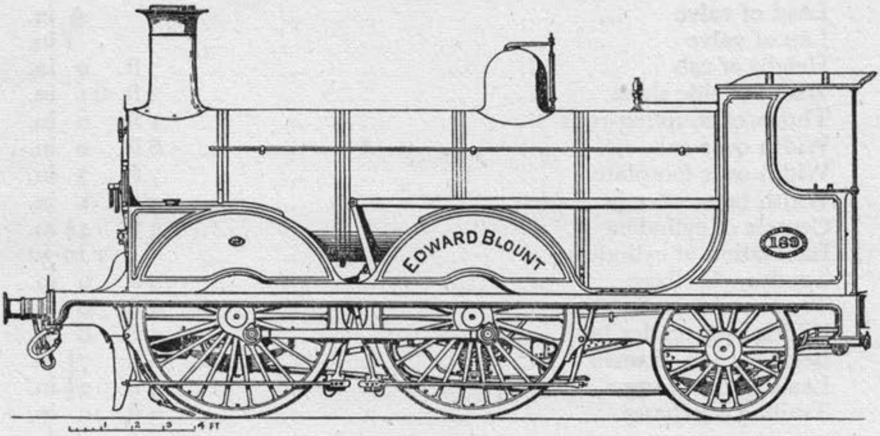
Bufferbeam to centre of bogie pin	5 ft. 2 in.
Bogie pin to driving axle	10 ft. 0¼ in.
Rear overhang of frame	4 ft. 4 in.
Footplate above rails	4 ft. 4 in.
Centres of buffers apart	5 ft. 8 in.
Centres of buffers above rail	3 ft. 5 in.
Diameter of smokebox	2 ft. 7 in.
Length of chimney	3 ft. 4⅜ in.
Diameter inside chimney	1 ft. 4 in.
Diameter of boiler lagging	4 ft. 6 in.
Diameter of safety-valves	2½ in.
Length of connecting-rods	5 ft. 11 in.
Length of eccentric-rods	5 ft. 2¾ in.
Ports	1½ in. and 3½ in. by 16 in.
Travel of valve	4 5/16 in.

Lead of valve	$\frac{3}{16}$ in.
Lap of valve	1 in.
Height of cab	7 ft. 0 in.
Width of side sheet	2 ft. 11 in.
Throw of coupling-rods	1 ft. 0 in.
Width over cab	6 ft. 0 in.
Width over footplate	7 ft. 7 in.
Width between 1 in. frames	4 ft. 1 in.
Centres of cylinders	2 ft. $4\frac{1}{2}$ in.
Inclination of cylinders	1 in 30
Tender wheelbase	12 ft. 0 in.
Tender wheels diameter	4 ft. 0 in.
Width over tender tank	5 ft. 8 in.
Between $\frac{7}{8}$ in. frames	6 ft. $7\frac{1}{4}$ in.
Leading overhang	4 ft. $2\frac{1}{2}$ in.
Trailing overhang	3 ft. 10 in.

The third exhibition locomotive was L.B.S.C.R. No. 189, *Edward Blount*. Not all those fortunate visitors who gazed at this arresting-looking engine would be aware of the intense care and thought that had been bestowed, not only on the design in general, but on every little elegant detail of the beautiful engine. Yet care and thought were not enough to make her the masterpiece she undoubtedly was. A masterpiece embodies those flashes of genius which her designer, Mr. William Stroudley, happily possessed in marked degree, and his engine was the product of all three qualities—care, thought and genius. Her general layout was as unusual as it was clever. Mr. Stroudley's first considerations had to be those of lightness combined with ample adhesive power and a short wheelbase. To gain these qualities he placed his coupled axle at the leading end where the heaviest parts (cylinders, motion, pumps, etc.) could bear on the leading axle. Incidentally, the leading wheels being as large as 6 ft. 6 in. diameter gave a big margin of safety to the engine when travelling round curves or over crossings, since a greater length of tyre flange was always below the top surface of the rail. The large trailing wheels (4 ft. 6 in.) were interchangeable with those of the tender and also



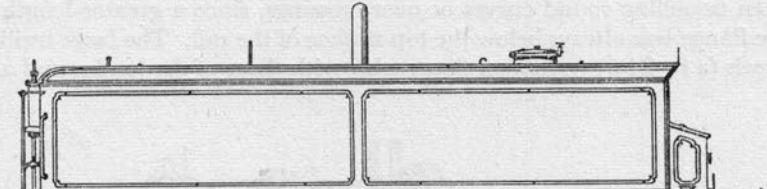
Note the jointed intermediate valve spindle of the link motion.



No. 189 *was the engine-drivers' dream come true—delightful to handle and very fair to look on.*

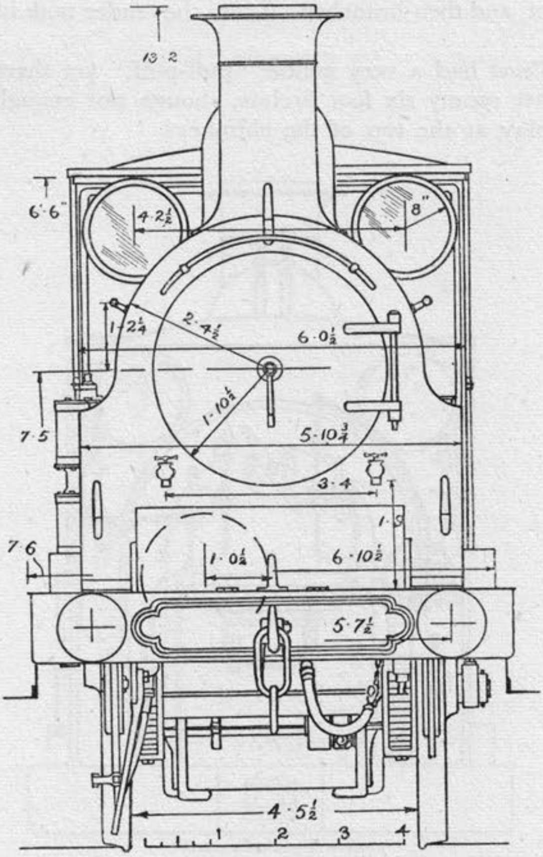
of the other classes of Stroudley engines, and with no restrictions as to length of coupling-rods, were free to be placed as far back as needs be to accommodate a long and deep firebox. This position of a pair of carrying wheels below the cab appealed to the enginemen, as it did away with the pounding of a coupled axle directly below where they were standing. The centre pairs of springs were given more flexibility than the other sets, so that the running of the engine approximated to that of a four-wheeled vehicle.

The spring loads of the two coupled axles were equal, whilst the centre of gravity of the engine was high and well forward ; also the drawbar of the tender was guided to swing radially, as though pivoted directly under the centre of gravity. The boiler and firebox were in harmonious balance ; indeed they could be lifted by a single sling hooked on just behind the



The tender for No. 189 *weighed only* 15 *tons* 7 *cwt. when empty.*

dome, and the balancing of the motion and the cranks (the latter by extensions of the crank-hoops) was well-nigh perfect. The result of all this was that when running, *Edward Blount* glided along as though floating on a lake.

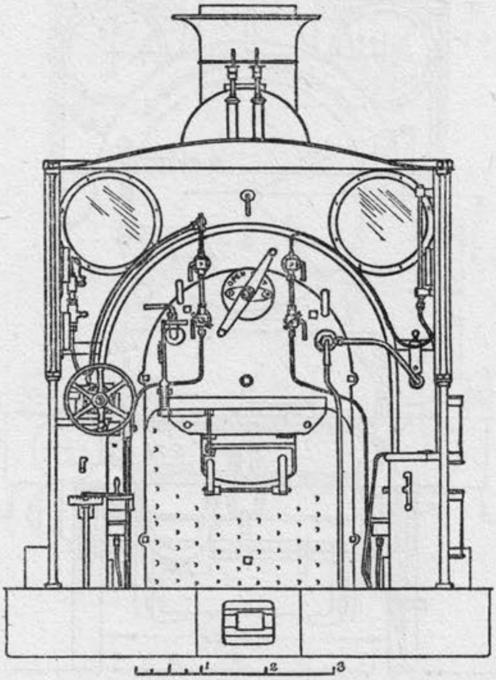


Many would say "the loveliest engine ever"—and maybe they would be right.

The two big cylinders (18¼ in. by 26 in.) were in one cylinder block—a fine piece of casting, and could thus be as close together as 25 in., centre to centre. This gave ample room for thick crank-webs, wide eccentrics and long journals. The slide-valves were below, inclined upwards at 1 in 15 to the crank-axle. In this inverted position they barely rested on their port faces when the engine was coasting.

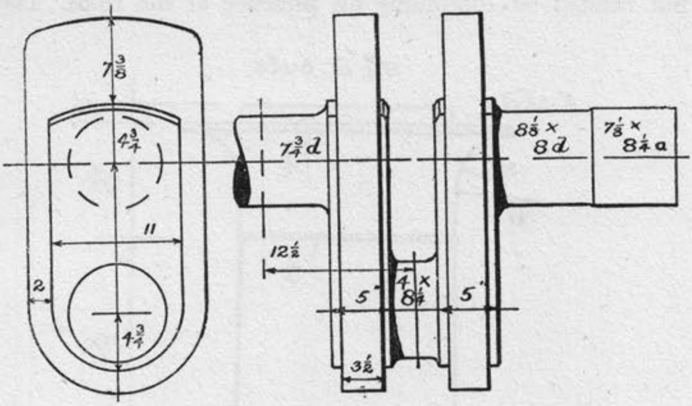
Mr. Stroudley, after watching drivers work his engines, noticed that they preferred induced draught to forced draught, so he provided a rear damper only to the big ashpan. In addition to this, only a portion of the exhaust steam puffed up the chimney, for the steam ports were divided so that part of the exhaust passed round the cylinder walls to keep them hot, and then branched off into the tender tank to heat up the feedwater.

Edward Blount had a very gentle "puff-puff," yet there was ample draught in her roomy six foot firebox, though not enough to cause a firework display at the top of the chimney!



A wonderfully neat cab layout. The interior was yellow, with white roof, firebox by stays black, and panel above the door-tray olive green.

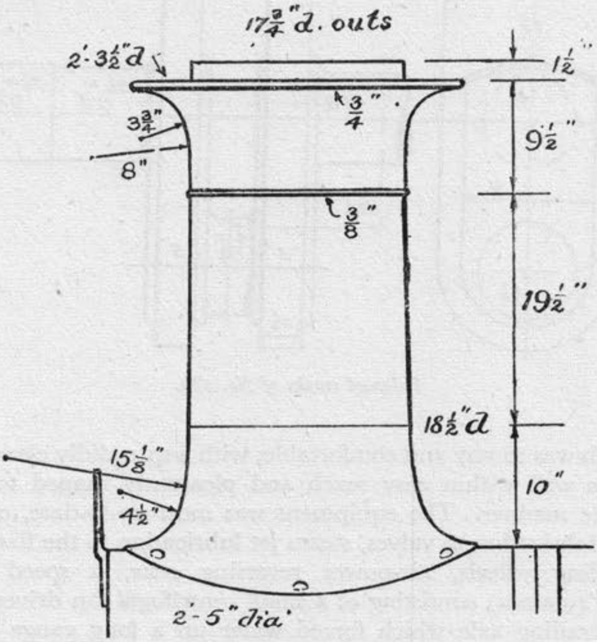
The tender, likewise, was designed with the greatest care. It was a shapely thing with its beautifully fashioned standard 4 ft. 6in. carrying wheels. These were well exposed to view owing to the employment of inside axle boxes and looked very jolly when in motion. They seemed to match the engine so well. The tender tank was surrounded by an air jacket contained within cleading plates to enable the feed to retain its high degree of temperature. Its trim coping only stood 4 ft. 1 in. above the platform, which enabled the fireman to stand on its two tons of coal without any risk of being struck by any overhead bridge. This excellently proportioned tender weighed only 15 tons 7 cwt. when empty. The result of all this planning was that the Gladstones proved marvellously economical engines, as will be related in due course.



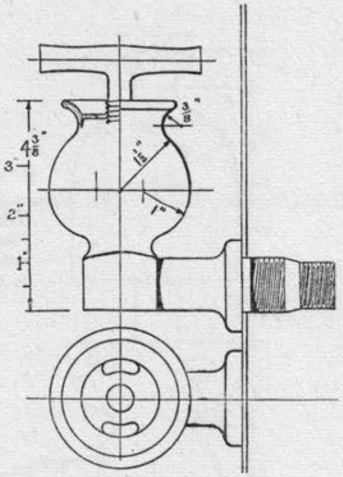
Balanced cranks of No. 189.

The cab was roomy and comfortable, with a splendidly clear look-out, all handles well within easy reach and pleasantly shaped to grasp in comfortable manner. The equipment was most up-to-date, comprising sight-feed lubrication to valves, steam jet lubrication to the flanges of the giant leading wheels, air-power reversing gear, a speed indicator (Stroudley's patent) consisting of a small centrifugal fan driven by band from the trailing axle which forced water up a long gauge glass with graduated scale. There was also steam sanding, and the provision of two water gauges (in lieu of the more usual single one plus test cocks), two gauge lamps, electric passenger communication, and the Westinghouse brake for engine, tender and train. In short, No. 189 was the engine driver's dream come true, delightful to handle—powerful and economical, a greyhound, and withal, exceedingly fair to look on. So the golden summer days of the " Exposition " passed away, and in the autumn the French authorities suggested a series of trials between the three engines. To this proposition the Midland Railway Company sent a polite refusal. After all, there was much to be said against the proposal. The engines were quite unalike in type, they had not been run-in, there was the difficulty of the slight difference between the English and French rail-gauge, and in any case No. 1853 was wanted for service at home.

The two other companies, perhaps out of deference to their French neighbours, accepted the invitation. Much of the trial line was set in order, the down road gauged to the normal 1.45 metres, the up line being reduced to 1.44 metres. On December 17th, No. 189 ran her first "heavy load trial." Coupled to 20 vehicles weighing 241 tons empty, she went from Paris to Laroche, 155 kilometres. A hot coupling-rod end prevented her from making the return trip. Mr. Stroudley took a bad chill, but insisted on continuing his presence at the trials. Two days later, No. 240 performed her double journey with the same load. But now Mr. Stroudley developed a sharp attack of asthma, and to everyone's sorrow, he died the next day, December 20th. Nothing more was done over Christmas, and it was not until the New Year when, on January 15th, No. 240 did her final heavy load trip, followed by *Edward Blount's* a week later, representatives of the Government and officials of the French Railways being present on both occasions. On the outward journey the S.E.R. engine lost seven minutes and homewards ten minutes on the scheduled time; whilst the L.B.S.C. locomotive kept exact time outwards and lost eight minutes returning. This was not only a slightly better performance, but the difference in coal briquettes was decidedly



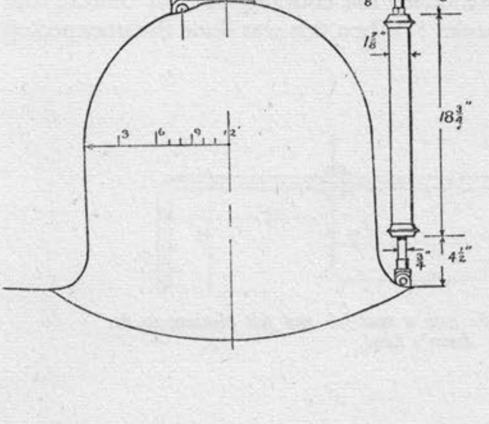
The perfect chimney—and how it matched the engine!



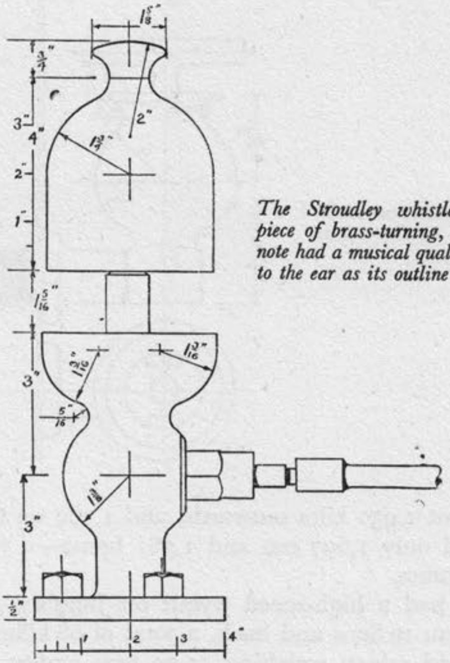
Stroudley's cylinder lubricator which Billinton also put on his first twenty goods engines.

marked. No. 240 burnt 1,950 kilos outwards, and 1,782 on the return; whereas No. 189 used only 1,697 out and 1,581 home—a total in her favour of 454 kilogrammes.

Both engines had had a high-speed tryout on January 17th, when they ran from Montreau to Sens and back, a total of 68 kilom., coupled to a small four-wheeled saloon weighing 11.39 tons empty. Next day

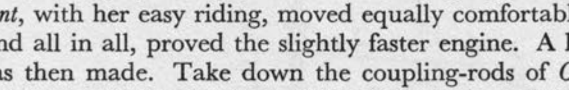


The Stroudley safety-valve was more elaborate than the Midland Railway version. However, Billinton used it on all his L.B.&S.C.R. goods engines when he returned to Brighton.



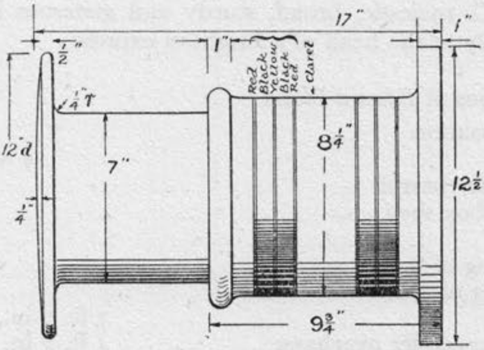
The Stroudley whistle was a nice piece of brass-turning, and its B flat note had a musical quality as agreeable to the ear as its outline was to the eye.

they both had the high-speed finals, the various officials again observing the performances. The best speed of No. 240 was 121 kilom. per hour, but No. 189 managed to attain 125 kilom. over the same route. It is only fair to state that *Onward* ran stiffly on the outward journey, but seemed more at home, strangely enough, on the reduced gauge of the up line. *Edward Blount*, with her easy riding, moved equally comfortably in either direction, and all in all, proved the slightly faster engine. A last-minute proposal was then made. Take down the coupling-rods of *Onward* and let her run as a 4-2-2 single-wheeler ! When this was done the unexpected



The Stroudley whistle handle was a neat job and felt pleasant to the driver's hand.

happened—she was not so fast as before, and never reached more than 115 kilom. per hour, except for a single kilometre at 117! But apart from this general fall in speed, she ran quicker uphill than down! No doubt, once having gained speed her increased freedom resulted in fast up-hill work; whereas down-hill her driving wheels may have tended to lift from the surface of the rail, thus causing a curious, though well-known, form of slipping. In any case, the hasty expedient of removing the coupling-rods would upset the carefully calculated balancing of a four-coupled engine. All things considered, Stroudley's engine appeared the better all-rounder, but it would seem that such competitive affairs are, at best, unsatisfactory things. Both engines were awarded gold medals and both had long and splendid careers. The South Eastern engine long out-lived her Brighton friend as it happened, but that was probably due to the locomotive policy of the Southern Railway in its early years, when a great many L.B.S.C. locomotives finished their useful careers somewhat abruptly. Of the three exhibits, *Edward Blount* was the most elaborately painted. Her colour, of course, was yellow, a beautiful golden tint, somewhat between newly-made and old mustard. It is said that it was a mixture of Oxford ochre, chrome, white and oxide. The edging of panels, splashers, etc., was olive green. This edging was separated by a 1½ in. black band having on its inner or yellow side a thin white line, and on its outer or olive-green side, a thin red line. The boiler bands were 2 in. wide, black, and with a thin red line each side. Next came a 2 in. olive band either side, painted on the yellow cleading and separated from the yellow by a thin white line. The polished brass number plate had a dark blue ground and black waxed lettering in its border. The cab roof was white. The angle frame was a rich claret, edged only on its outer side by a narrow black band having a fine yellow line on its outer edge and a fine red on



Standard Stroudley buffer showing the two painted bands across the claret socket.

its inner side next the claret. The whole of the shapely buffer sockets were also claret (crossed by two bands as per diagram) and the buffer-beam was also claret with a vermilion panel in its centre. This latter panel was edged with a broad black band, bearing a yellow central stripe, a white one next the vermilion and a red one next the claret margin. The coupling-rods were claret, with long polished ends and eyes. Guard irons, sandpipes, inside of main frames, motion plate, cranks and eccentric-rods red. Spokes and hubs yellow, with axle ends and tyres olive-green. Brake gear black. Name in gilt letters, shaded left hand with light green bearing small strokes of white and claret, and shadowed right-handed in black.

Interior of cab yellow, front of firebox lagging plate (within the large 6 in. radius yellow curved edge-plate which was yellow) olive-green, and below the driver's bottle-tray black. This latter surface, of course, was the actual firebox front. Above the whistle handle, the driver's name and record of mileage was done in gilt capitals and italics. Reversing wheel spokes olive-green. Rim polished. And so we leave our three historic engines, remembering that models of them would enable us to recapture some of their fascination of movement ; the M.R. gliding along, her balance weight alone marking time, the S.E.R. with her bounding action, and the L.B.S.C. majestic, broad, sturdy and generous looking as she floated effortlessly at the head of a Brighton express.

Useful Dimensions of *Edward Blount*

Cylinder inclination	1 in 11½
Ports	1½ and 2 by 15 in.
Length of boiler barrel	10 ft. 2 in.
Length of firebox shell	6 ft. 8 in.
Grate area	20.65 sq. ft.
Front overhang of frame	5 ft. 10 in.
Rear overhang of frame	4 ft. 4 in.
Wheelbase	7 ft. 7 in. and 8 ft. 0 in.
Front and rear tender overhang	4 ft. 2 in. and 4 ft. 2 in.
Total length of engine and tender	51 ft. 10 in.

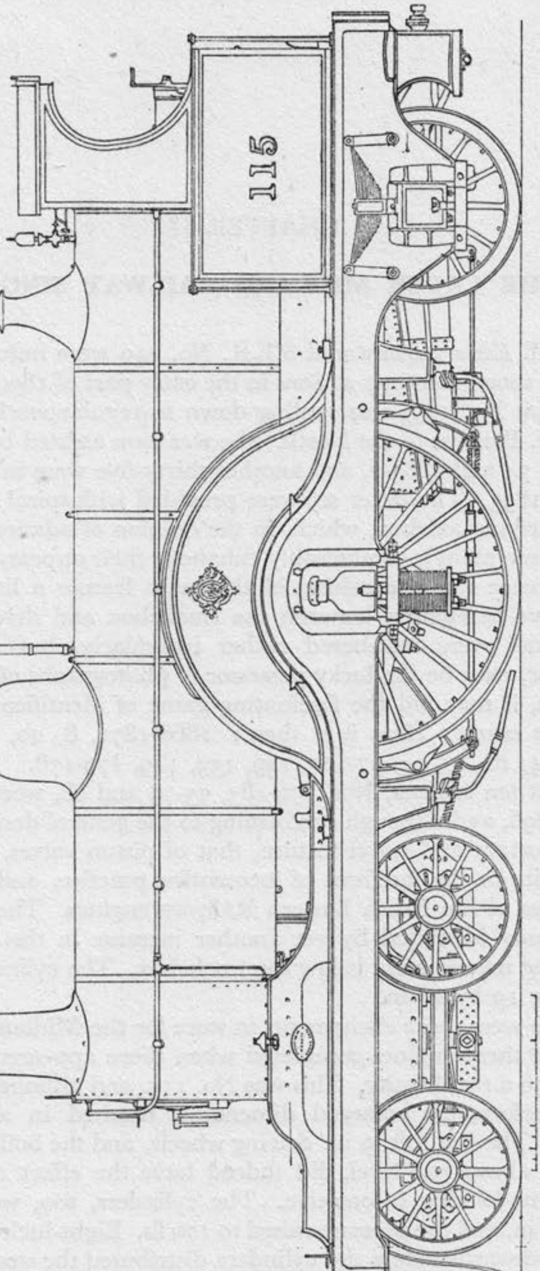
CHAPTER II

THE LATER MIDLAND RAILWAY SINGLES

WHILE *Edward Blount* and S.E.R. No. 240 were indulging in those little sports meetings at Sens in the early part of 1890, the Midland exhibit No. 1853 was settling down to regular work on the main line from St. Pancras to the North. She was soon assisted by half a dozen sisters, Nos. 34 and 1863-7, and another thirty-five were in service before the end of 1893. The latter set were provided with spiral springs underneath the driving axlebox, which, in the opinion of admirers of the class (and they were many), considerably enhanced their appearance. Another slight difference was the raising of the main frames a little above the footplate level stretching between the smokebox and driving splashers. These engines were numbered rather irregularly, but as you, good locomodeller, may be the lucky possessor of photographs of some of these fine engines, it may aid the fascinating game of identification if the list is quoted *in extenso*. Here it is then : 1868-1872, 8, 20, 122, 145, 24, 33-6, 38-9, 4, 16, 17, 94, 97-100, 129, 133, 149, 170-178.

The next ten engines, Nos. 179-183, 75-79 and 88, were produced in 1893 and 1896, and although conforming to the general design, embodied a most important and novel feature, that of piston valves. At the time, this was quite in the forefront of locomotive practice, and followed the modern ideas of the North Eastern Railway engines. These ten singles could be easily identified by yet another increase in the height of the main framing immediately below the smokebox. The cylinders also were larger, being 19 by 26 in.

But there were more excitements in store for the Midland enthusiasts. Hardly were these engines completed when there appeared from Derby works in 1896 a real beauty. This was No. 115, and although to the same designs as before, the enlarged dimensions resulted in a very sturdy locomotive. The big 7 ft. 9 in. driving wheels, and the boiler pitched up 7 ft. 10 in. above rail level, did indeed have the effect of making an extremely fine-looking locomotive. The cylinders, too, were increased to 19½ by 26 in. and the pressure raised to 170 lb. Eight-inch piston valves, inclined downwards below the cylinders distributed the steam. Nos. 115 and 116 arrived in 1896, followed by 117-119 in the next year.

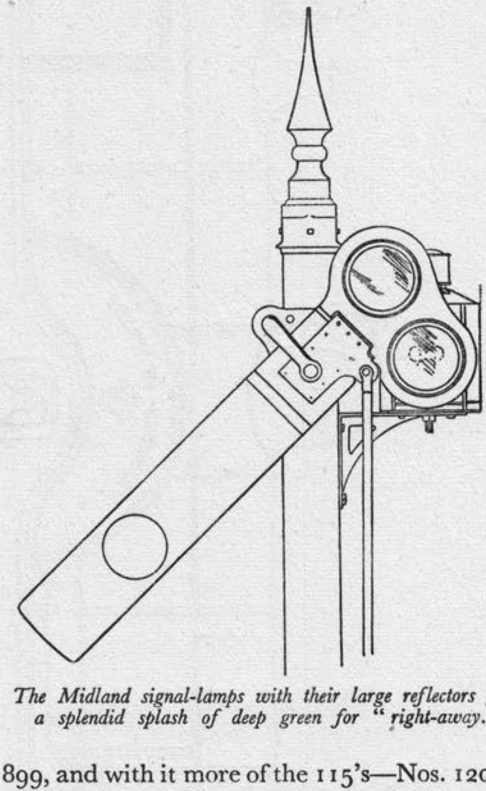


The 115 *design was the classic M.Ry. example*

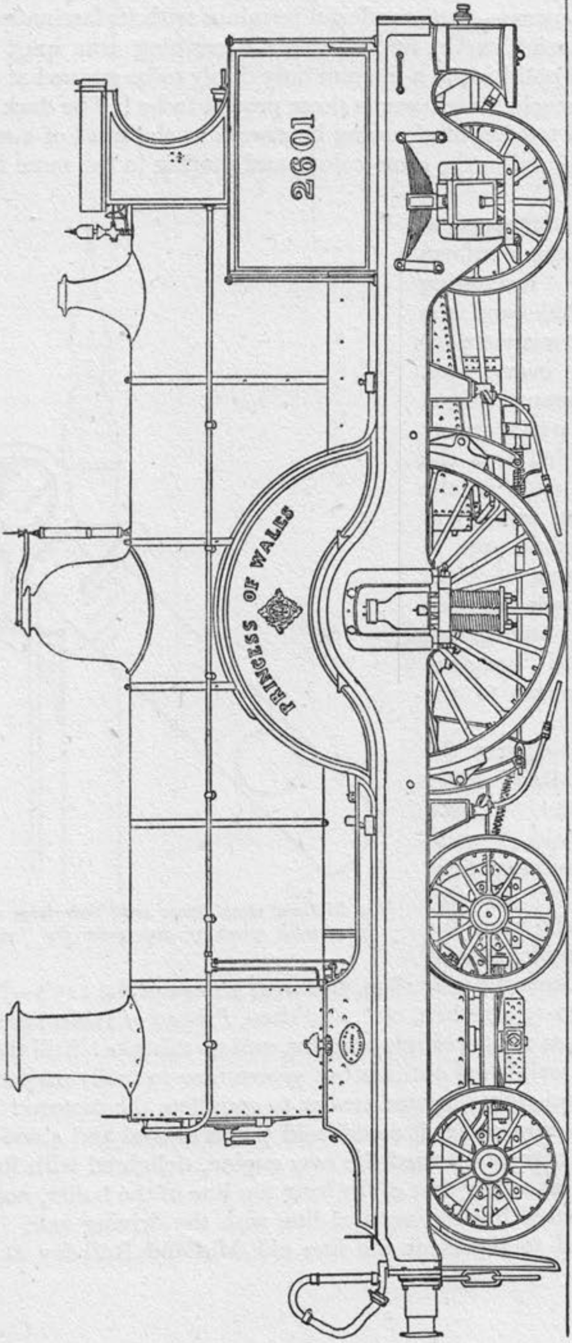
How we used to love to watch these splendid engines steaming in and out of St. Pancras—that wonderful terminus with its fascinating one-span roof of graceful curve, under which everything was spick and span, painted and polished, in a manner only dimly to be guessed at nowadays! What a spectacle a night scene there proved to be! The dark red engine with its rich touches of gleaming brasswork at the head of a superb set of carriages painted in the same colour and sharing in the same high degree of finish.

In the darkness at the end of the platform stood the interesting starting signal—and the Midland signals were interesting in every way. They had many unique features, prominent amongst which was the absence of lenses in the lamps. The result was that one could see a fascinating spot of flame shining through the deep green glass, and giving a vivid and beautiful splash of colour to the general scene.

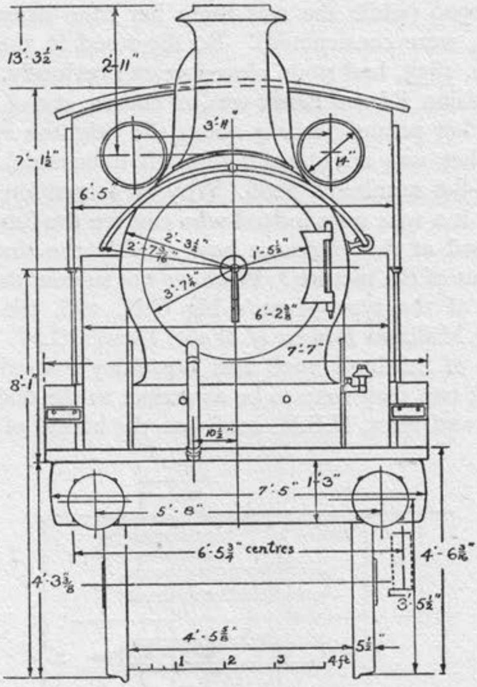
Yes, those were the days of Midland glory right enough! "Could there," we said, "could there be anything finer than this?" To this question Derby gave the very remarkable answer of "Yes." Came the year 1899, and with it more of the 115's—Nos. 120-1, 123-8 and 130-1, and then, oh! and then, *Princess of Wales* sailed into our ken! Here was a super-single-wheeler, and no mistake! Still the same old familiar and well-loved outlines but grown now to really majestic proportions. And an eight-wheeled tender to complete the picture! A mighty thing it was—no wonder it could hold 7 tons of coal and 4,000 gallons of water! We eagerly scanned the new engine, delighted with its harmonious outline, especially that of the long top line of the boiler, now that the dome was shifted back in vertical line with the driving axle. A worthy engine indeed to represent the fine old Midland Railway at the Paris



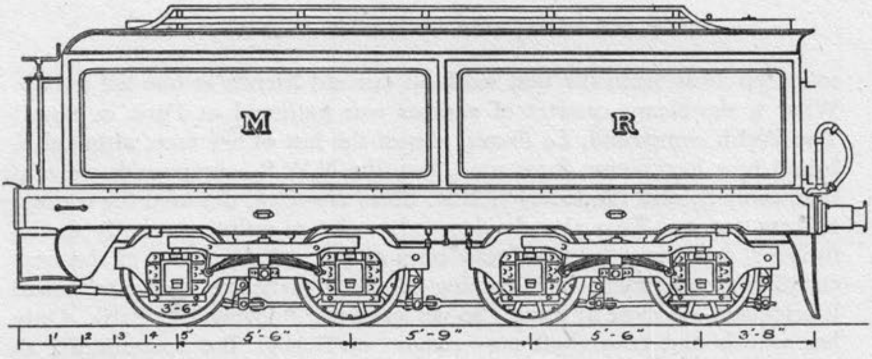
The Midland signal-lamps with their large reflectors gave a splendid splash of deep green for "right-away."


2601
PRINCESS OF WALES

Could anyone wish for a finer locomotive? The M.Ry. exhibit at Paris, 1900.


13'·3½"
2'-11"
7'-1½"
3'-11"
14"
6'·5"
2'-3½"
2'-7$\frac{3}{16}$"
1'-5½"
3'-7¼"
6'-2⅜"
7'-7"
8'-1"
10½"
7'-5"
1'-3"
5'-8"
6'-5¾" centres
4'-6$\frac{3}{16}$"
4'-3⅝
3'-5½"
4'-5⅝"
5½"
1
2
3
4ft

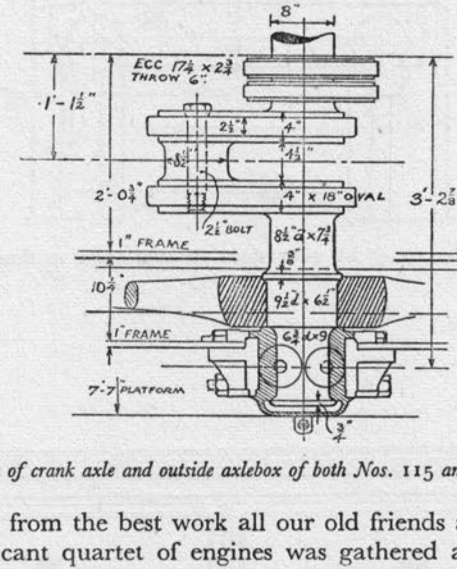
This elevation of No. 2601 shows the same widths as those of No. 115.


M
R
3'-6"
1'
2
3
4
5'
5'-6"
5'-9"
5'-6"
3'-8"

One of the best designs of the period when bogie tenders were all the rage.

Exhibition of 1900 (while she was there her nine sisters, Nos. 2602-8, and 22 and 23, were constructed). So she stood in the gay capital as her forbear, No. 1853, had stood eleven years previously.

On this occasion *Edward Blount* was, of course, not of the company—she was still in her prime, dashing about the Brighton system. Instead, quite close to her was an unusual (though handsome) North Eastern engine, a big 4-6-0 numbered 2006. Why do I mention this so particularly? Well, it is a wise man indeed who can see the future. How could one have guessed at that moment how quickly the single-wheeler was going to fade out of the picture? Were we not surrounded with magnificent examples of the type—Ivatt's big G.N. 266, the Great Central Pollitt 967, the Midland *Princess of Wales*, Dean's G.W. *Lord of the Isles*, to say nothing of Stirling's 1008 and Stroudley's wonderful *Grosvenor*? But in a year or two they were to be as extinct as the dodo, for, aided by finer steel rails and tyres, N.E.R. 2006 was the herald of a type destined to sweep away from the best work all our old friends at one fell swoop. What a significant quartet of engines was gathered at Paris in 1900! The Webb compound, *La France*, almost the last of her race, although a brand new locomotive (how soon, too, the N.W.R. compounds were to fade away!), and the lovely G.E.R. *Claud Hamilton*, destined for a magnificent career. Two already doomed, and two pointing stoutly to the future ; and even the two lucky ones as yet not dreaming of the next startling development—the coming of the superheater and mechanical lubrication—so close at hand. So we leave our " lovely " at Paris. Only her wheels and crankshaft now remain at Derby. But sometimes I *do* wish I could see her again, if just for a moment!



Plan of crank axle and outside axlebox of both Nos. 115 *and* 2601.

Useful Dimensions

The 115 *Class*

Cylinders	19½ in. × 26 in.
Ports	17¾ in. × 1⅜ in.
Lap	1⅛ in.
Lead	⅛ in.
Travel	$3\frac{11}{16}$ in.
Piston valves	8 in. dia. × 2½ in.
Distance apart	12 in.
Length of eccentric-rods	4 ft. 3⅞ in.
Length of connecting-rods	6 ft. 3½ in.
Inclination of cylinders and valves (above and below)	1 in 16
Diameter of boiler lagging	4 ft. 7 in.

N.B. All the above apply also to the " Princess of Wales."

Bogie wheels	3 ft. 9½ in.
Trailing wheels	4 ft. 4 in.
Wheelbase : bogie	6 ft. 0 in.
,, bogie pin to driving axle	10 ft. 2½ in.
,, rear	8 ft. 9 in.
Front overhang	2 ft. 6 in.
Rear overhang	4 ft. 2 in.
Height of cab roof above rails	11 ft. 5 in.
Height of chimney	3 ft. 0 in.
Height to top of platform	4 ft. $3\frac{5}{16}$ in.

" *Princess of Wales* " *Class*

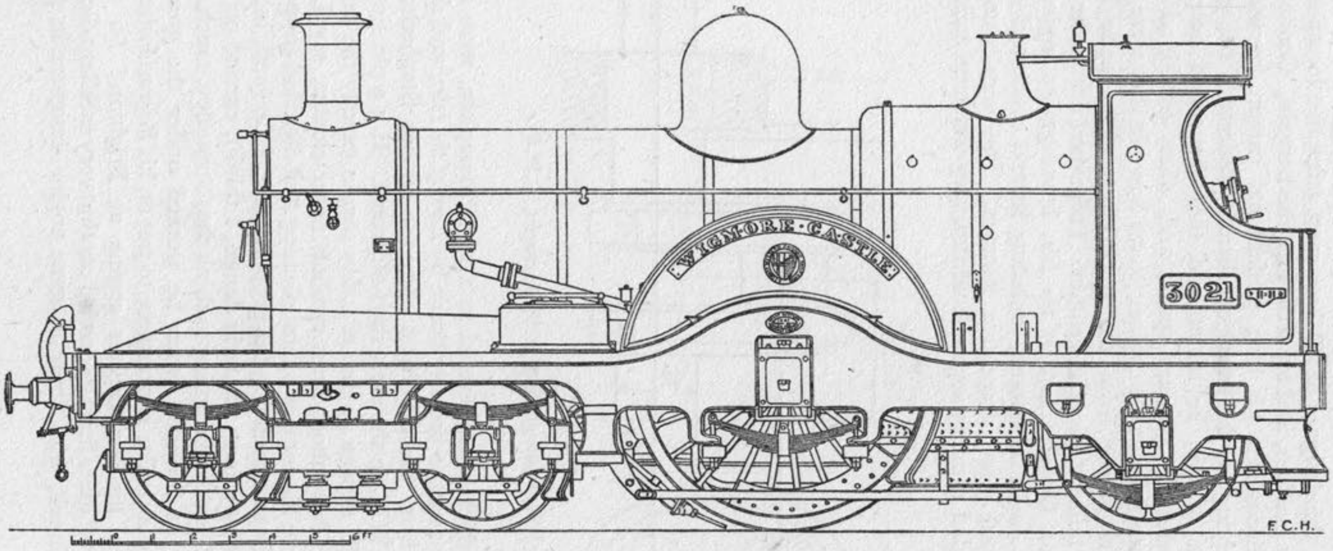
Bogie wheels	3 ft. 10 in.
Driving	7 ft. 9½ in.
Trailing	4 ft. 4½ in.
Wheelbase : bogie	6 ft. 0 in.
,, bogie pin to driving axle	10 ft. 2½ in.
Rear axle	9 ft. 9 in.
Front overhang	2 ft. 6 in.
Rear overhang	4 ft. 2 in.
Length of boiler	10 ft. 6 in.
Length of firebox	8 ft. 0 in.
Height of cab above footplate	7 ft. 1½ in.
Tender : bogie frames (1 in.)	6 ft. apart
,, width of tank	7 ft. 0 in.
,, width over coping	8 ft. 0 in.
,, width over footplate	7 ft. 7 in.
,, journal centres	6 ft. 6 in.
,, total wheelbase of engine and tender	49 ft. 7¼ in.

CHAPTER III

A G.W.R. CONTEST

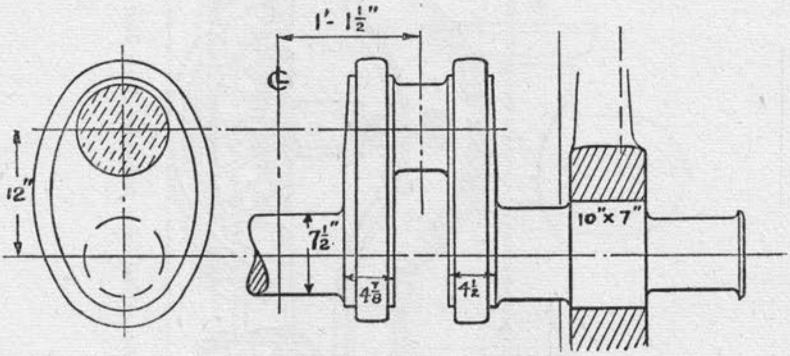
EVERYONE loves a contest, be it the Boat Race, a Cup Final, or a railway Race-to-the-North. Admirers of the G.W.R. engines must have been very thrilled when early in the spring of 1894, the first 4-4-0 express locomotive made its appearance. This newcomer, No. 7, *Armstrong* was a 7 ft. four-coupled version of the already famous 7 ft. 8 in. single-wheelers. Since it was seen that she carried an identical boiler, working at the same 160 lb. pressure, could it be that she would prove a competitor to the wonderful " Singles " ? For the last two years twenty of these grand engines had been in steam daily, performing great deeds between Paddington—Bristol—Newton Abbot, on an average coal consumption of 31 lb. per mile. That would take some beating ! By June of the same year three more of the new type had attracted attention ; No. 8, *Gooch*, No. 14, *Charles Saunders*, and No. 16, *Brunel*. The quartet had bigger cylinders, 20 by 26 in. against the 19 by 24 in. of the singles, otherwise they were all remarkably alike. Their boilers were pitched 2¾ in. lower, at 7 ft. 4¾ in. and this made them look perhaps a little less sturdy than *Wigmore Castle* ; but their coupled wheels were large ones, 7 ft. 1½ in., and their massive and well proportioned outside cranks gave a wonderful impression of power and speed, as they majestically swung round. I always loved outside-cranked engines (just think, good modeller, of Stroudley's *Belgravia*, or Kirtley's *Europa* !) and one is most grateful to those in command at Swindon for their adherence, even today to this fascinating feature of the " Dukes " and " Bulldogs," some of which still happily swing their way along the G.W. (sorry, British Railways, Western Region) main line.

The *Armstrong* class, with their fine proportions and flashing brass and copper work, need no recommendation of mine. One has only to look at scale drawings of these engines (and, mind you, a side elevation is but a cold and precise statement of fact) to feel the Great Western glow of enthusiasm beginning to circulate throughout one's entire system ! And, of course, a model—well, well, that's the nearest thing one *can* achieve to a plunge back into the glorious nineties ! There is no doubt that


WIGMORE·CASTLE
3021
F.C.H.
0
1
2
3
4
5
6 FT

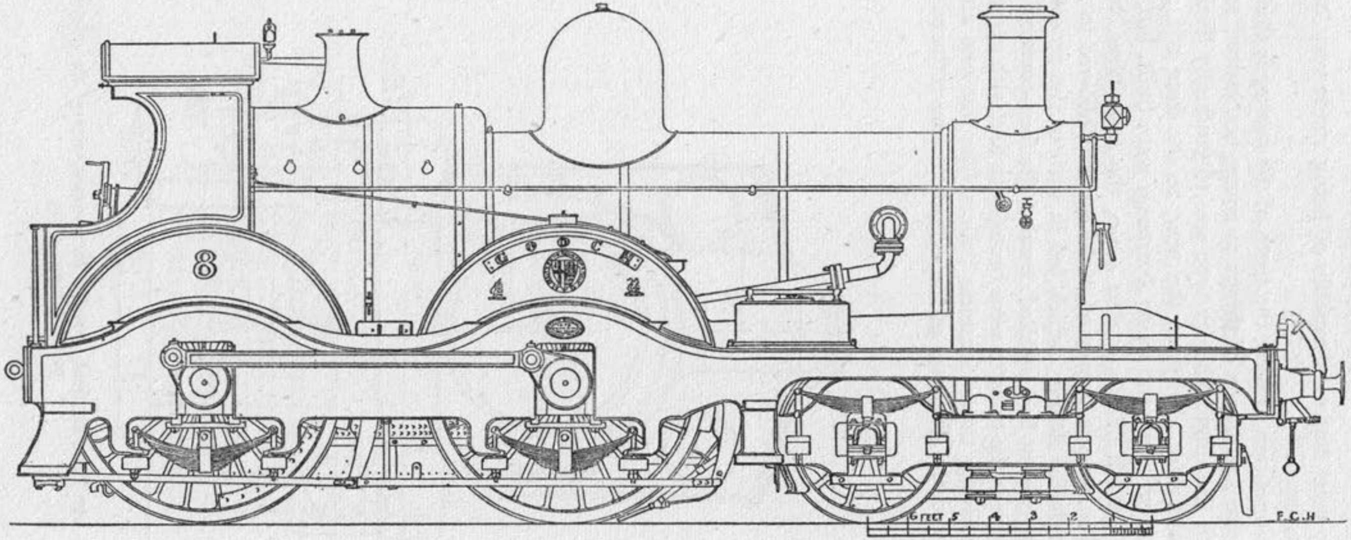
The first of the famous G.W.R. 4-2-2 express engines, often proclaimed as the most handsome of all locomotives.

William Dean, the designer of all these most attractive locomotives, was an engineer *par excellence*, and an artist into the bargain. Connected with the G.W.R. throughout his long professional career, he was a firm believer in carrying on the many excellent traditions of the great line. As an example of this, he maintained that the raised outer firebox provided a useful extra steam space, and when combined with the tremendous dome he gave his engines (to see how big they were, just take a three-quarters glance from the smokebox end!), made his quite moderate sized boiler a splendid steamer. This raised firebox he had been familiar with on Gooch's *Lord of the Isles* broad-gauge engine. Many other instances could be quoted, including several concerned only with the external and more decorative features. The very nameplate of *Armstrong* afforded a pretty example of this very welcome conservatism.



Crank axle of the 7 ft. 8½ in. singles, G.W.Ry.

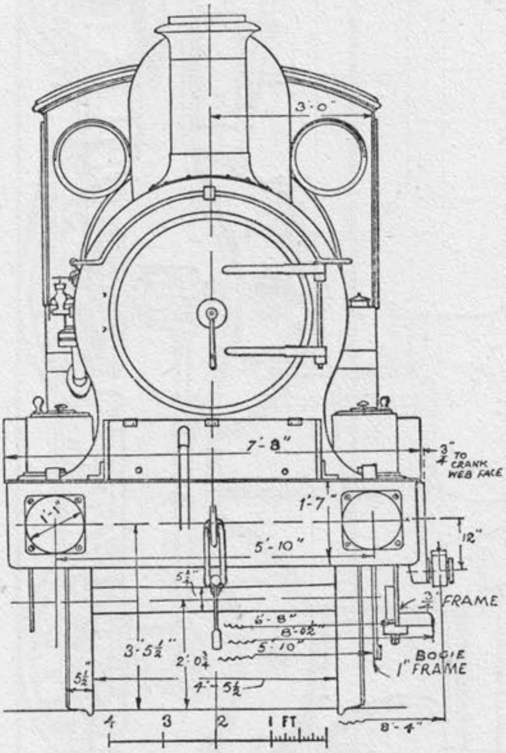
The letters of thick brass, riveted to a metal baseplate, were of exactly the same shape as those proudly borne by *Lord of the Isles*, and she in turn derived them from the old *North Star*, the famous Stephenson engine built for the G.W.R. in the early days of Brunel. It is a pleasing thought that the G.W.R. express engine of today carries exactly the same handsome lettering. May those brass symbols never change, say I, for one. Gooch, too, gave his engines a most pleasing and dignified copper-capped chimney, and Dean, modifying the proportions a little (and, incidentally, thereby producing a most masterly design, I think), carried on the tradition. And, oh! isn't it intriguing to think that Stroudley, much impressed by all he saw at Swindon when he worked under the great Gooch, himself designed a similar masterpiece to put on his *Belgravia* when his turn came to design his first express engine at Brighton! So these two "engineer-artists" quite literally carried out that very excellent dictum of the great Brunel himself, who wrote to some engine designers in 1838 these


8
GOOCH
FEET 5
4
3
2
F.C.H

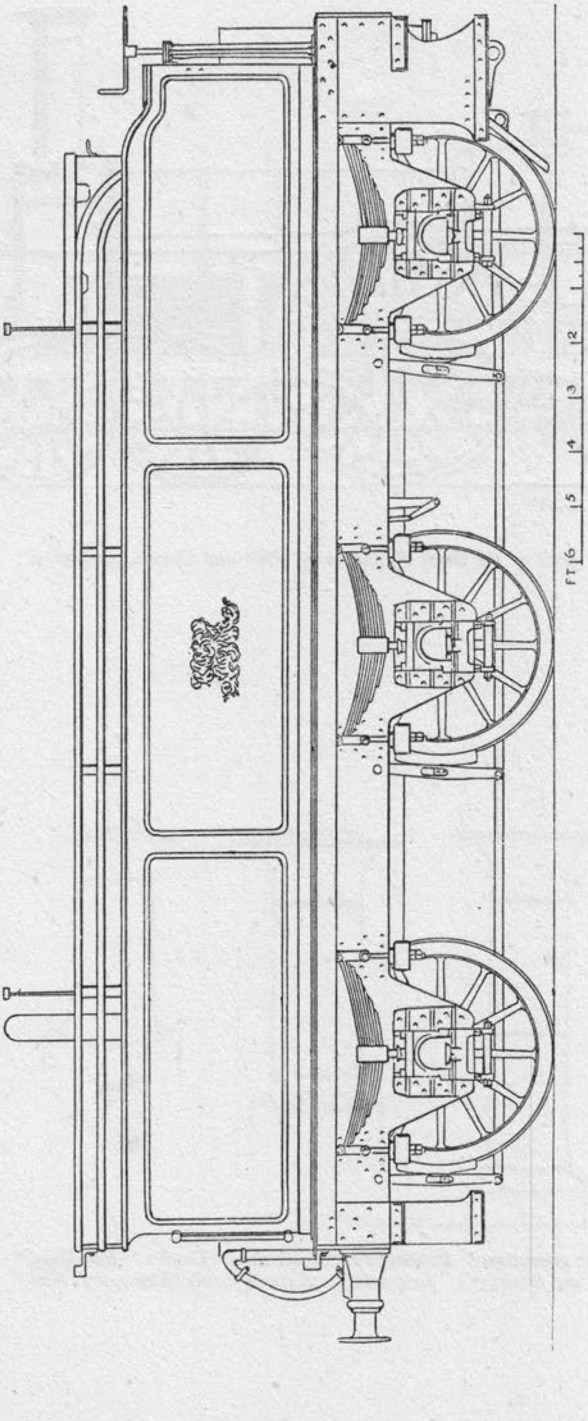
The G.W.R. shield in cast-iron was a grand ornament displayed on the splashers of this locomotive.

words: "Now your engine is capable of being made very handsome—and it ought to be so."

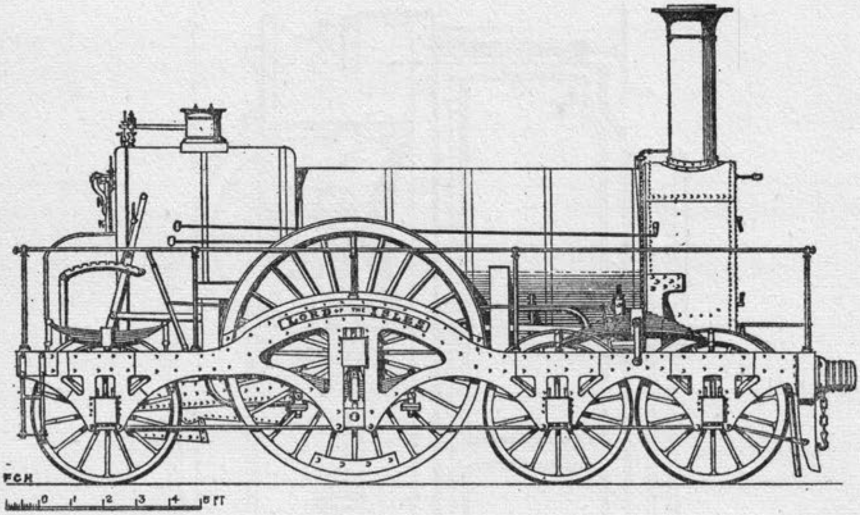
And the competition? Well, the truth of the matter is that these four new engines were harbingers of things to come, not indeed at once, but from henceforth the single-wheeler type was to gradually decline, giving place, as the old must always to the new, to the four and six coupled express locomotive. True, no more *Armstrongs* were built, but three years later the next version of the express 4-4-0, the *Badmintons*, with slightly smaller 6 ft. 8½ in. wheels, appeared, to be quickly followed in 1900 by the lovely and wonderful *Atbaras*, which led in turn to the renowned *City of Bath* class. The contest had finished, leaving the four-coupled the victors. From 1905 onwards the quartet were brought in line with current G.W.R. practice by receiving taper domeless boilers (the last one altered being *Gooch* herself) and the diameter of the cylinders were reduced to 19 in.



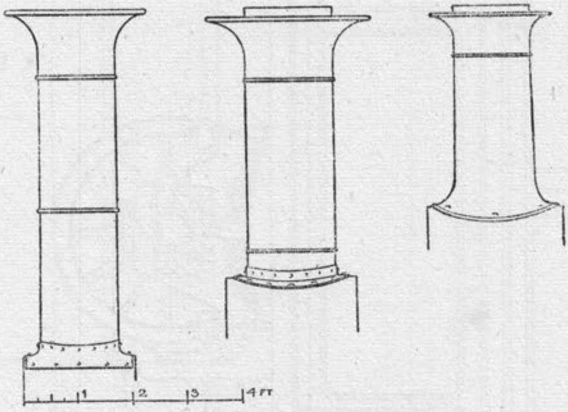
No. 8 *seen from the front, showing the enormous size of the splendid polished brass dome.*



The 3,000 gallon tender of "Gooch."


LORD OF THE ISLES
FCH
0 1 2 3 4 5 FT

The pride of the Great Exhibition of 1851 *and Gooch's masterpiece.*



Three generations! Stephenson's "North Star" Gooch's "Iron Duke," and Stroudley's "Belgravia." A strong family likeness, isn't there?

Useful Dimensions

	Gooch	*Wigmore Castle*
Wheels : driving	7 ft. 1½ in.	7 ft. 8½ in.
„ bogie and tender	4 ft. 1½ in.	4 ft. 1½ in.
Wheelbase : bogie	7 ft. 0 in.	7 ft. 0 in.
„ bogie to driving axle	7 ft. 6 in.	7 ft. 6 in.
Driving to trailing axle	9 ft. 0 in.	9 ft. 0 in.
Trailing to tender axle	9 ft. 3¼ in.	9 ft. 0¼ in.
Tender leading to centre axle	7 ft. 6 in.	7 ft. 6 in.
„ centre to trailing axle	7 ft. 6 in.	7 ft. 6 in.
Total length over buffers	57 ft. 10¾ in.	57 ft. 7¾ in.

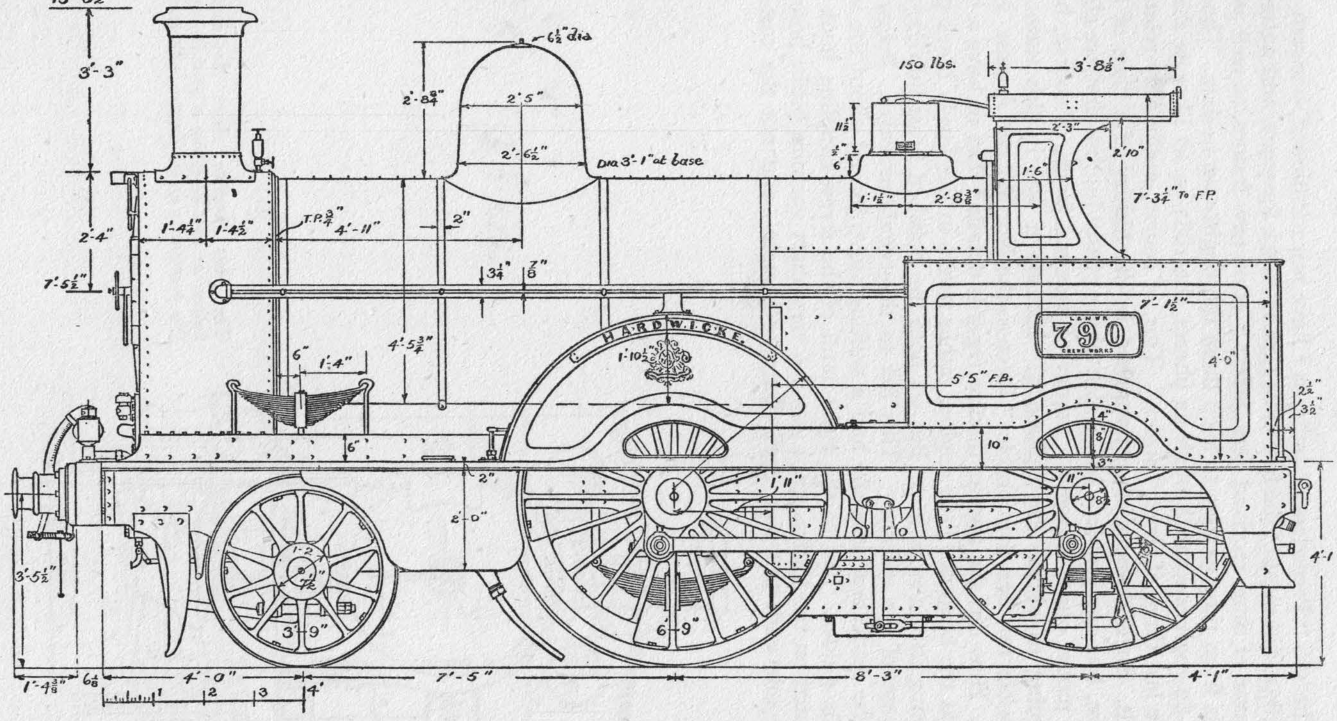
CHAPTER IV

THE L.N.W. RAILWAY "PRECEDENTS" AND THEIR PILOTS

IT would be waste of time to sing the praises of the famous 166 engines which comprised the "Precedent" class of the London and North Western Railway. Dear old "Precedents"; how lovely they were! How familiar and how excellent! Was there ever a more celebrated class of locomotive? I very much doubt it. *Hardwicke*, *Eamont*, *Vulcan* and *Charles Dickens* were perhaps the best known of the gallant 166, the first three for their record runs, the fourth for its daily round trip Manchester-London and back to Manchester.

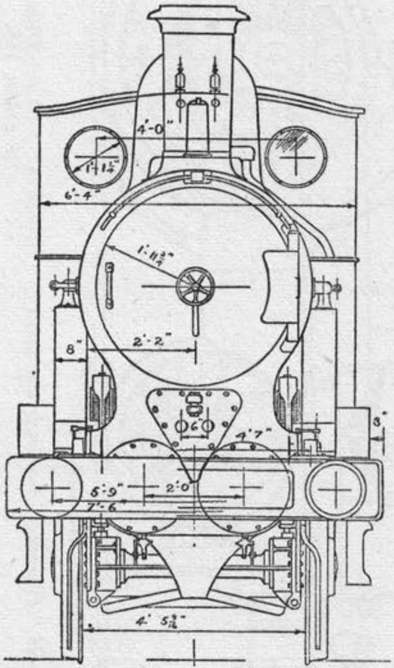
Now, in December, 1874, F. W. Webb turned out from Crewe works the first express engine which was entirely his own design. She was No. 2175, *Precedent*, and she was followed by 69 sisters, the last of which, No. 955, *Charles Dickens*, was completed by February, 1882.

These 70 engines were an interesting example of things "old and new"; there was much of the earlier traditional L.N.W. detail in them, but also much that was fresh to Crewe practice. Allan's straight-linked valve motion, vee-shaped steam chests with inclined slide-valves, a cylindrical regulator valve situated in the smokebox, and a modified form of Ramsbottom safety-valve were amongst the novelties. The engines were a great success, they ran like greyhounds and pulled like elephants (indeed, later on they were dubbed "the Jumbos"), and their designer attributed these two virtues to the fact that their exhaust passages were so direct and free. It was not long before more of the class appeared. In 1887 a new batch, headed by No. 271, *Minotaur*, appeared, and no less than 96 engines in this series were completed by the year 1894, No. 2005, *Lynx*, was the last of this group, which also included the famous No. 790, *Hardwicke*, built in April, 1892. These 96 new locomotives were given the numbers and names of 96 old 2-4-0 Ramsbottom *Newton* class engines of a totally different design which were scrapped at that period, but—talk of modern economy!—most of the old brass nameplates were put on the new engines, after having been stamped with the word "rebuilt" and the new date! Could anything have been more misleading to the locomotive historian?

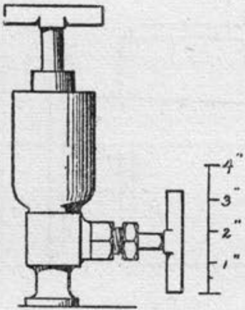

13'-0½"
3'-3"
2'-4"
7'-5½"
6½" dia
2'-8¾"
2'-5"
2'-6½"
Dia 3'-1" at base
150 lbs.
3'-8⅛"
11½"
½"
6"
2'-3"
2'-10"
1'-6"
1'-1½"
2'-8⅜"
7'-3¼" To F.P.
1'-4¼"
1'-4½"
T.P. ¾"
4'-11"
2"
3¼"
⅞"
4'-5¾"
6"
1'-4"
HARDWICKE
1'-10½"
L N W R
790
CREWE WORKS
7'-1½"
4'-0"
5'-5" F.B.
2½"
3½"
4"
8"
3"
10"
6"
2"
2'-0"
1'-11"
11"
8½"
1'-2"
3'-5½"
3'-9"
6'-9"
4'-1
1'-4⅜"
6⅛
4'-0"
7'-5"
8'-3"
4'-1"
1
2
3
4'

Dear old "Precedents," how lovely they were! "Hardwicke," "Charles Dickens," "Eamont" and "Vulcan" were perhaps the most famous of the gallant 166.

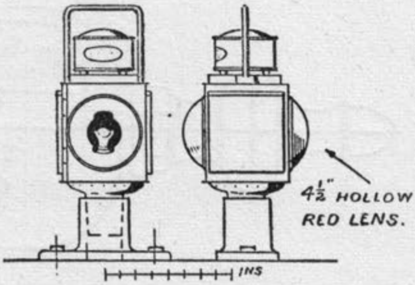
The 166 " Precedents " built, as I have just mentioned, between 1874 and 1894, did most of the first-class L.N.W. work for years, and naturally, in course of time, received new boilers ; often new frames, as well as odd details from time to time to keep them thoroughly up to date. Thus the 1874-82 engines went through six phases, the 1887-94 set likewise sharing in the last three of these " states." This, of course, really only relates to details. Such changes often happened in the history of a class of locomotive, but our problem is : which phase of the Jumbos shall we choose if we model one ? Largely a matter of personal fancy, of course, but I am going to plump for " phase 5," because it was in this state that *Hardwicke* ran her memorable " Race-to-the-North," on August 22nd, 1895. How did she appear then as regards details ? Let us have a quiet look at the beautiful little engine, rather severe in her lovely black paint gleaming in the sunshine. But we note the polished brass lubricator at the base of the chimney. This fed to the regulator valve. Below the circular smokebox door she had a snifting valve placed about the valve spindle guides. Just to the right-hand of the screw-coupling hook and mounted on the buffer-beam was the very short vacuum brake hosepipe —the one with the pipe curved at the bottom—and not the cast-iron



The front elevation shows the smokebox hopper, as well as giving a good idea of the fine proportions of the famous " Precedents."



The polished brass regulator-valve lubricator, mounted at the base of the chimney was an attractive little feature.

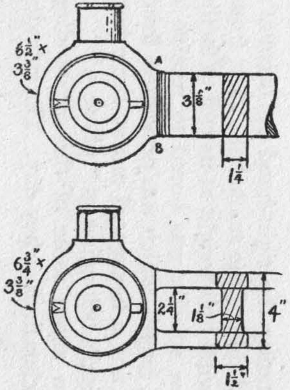


One could see the actual flame through the clear glass of "Hardwicke's" charming headlamps. The double-cone reflector was also a nice example of the skill of the coppersmith.

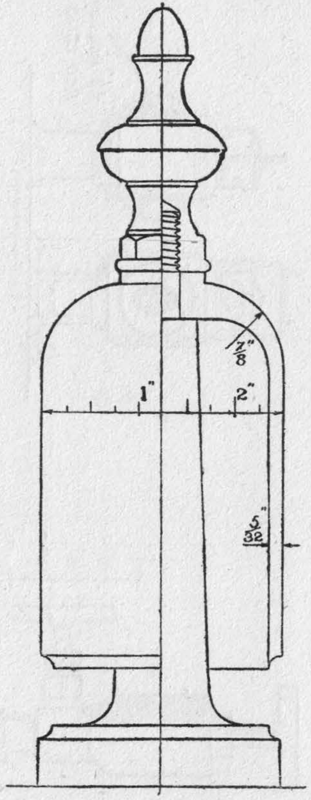
bracket pattern of later days. Only two lamp sockets on the buffer-beam—one near each end. These supported those charming Webb headlamps fitted with white and red hollow lenses back and front. They gave a rather poor light, often blew out (but then, which design of headlamp doesn't blow out?), and they wouldn't stand up if out of their sockets! But they were delightful things to look at, all the same! So *Hardwicke* screamed her way to Carlisle on that celebrated night, a white light over each buffer showing in front, and their corresponding ruby glass gleaming to the rear. She had the trim little 3⅛ in. by 1½ in. coupling-rods then painted entirely black except for the polished circular ends. Extraordinarily light, these rods seemed for such heavy and fast work as fell to the lot of the Jumbos, and on a 12 in. throw, too! Some two years later they were supplanted by 4 in. fluted polished steel rods of much heavier section. Two whistles were on the cab roof, the right-hand one being the passengers' alarm, actuated by the roof-cord threaded through the two little davits on the tender. Cab-roof black, and no coal-rails round the tender. The handrails were attached to the vacuum-brake ejector pipe, and were placed at the centre line of the boiler, 7 ft. 5½ in. above the rails. (The 1874-82 engines originally had the hand-rails 7 in. higher than this.)

The blower valve, actuated by rotating the right-hand or fireman's handrail, was placed on the right-hand side of the smokebox. The front screw-coupling no longer had an arm with bob-weight at its end to facilitate tightening-up. Instead, the screw spindle was bored to receive a turning-rod, ⅞ in. in diameter by 12 in. length, which was prevented from falling out by a little knob at one end and a hexagonal nut at the other. This completes most of the external details belonging to "phase 5."

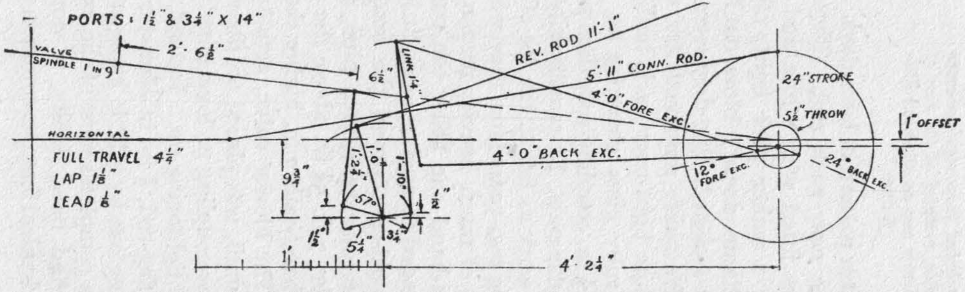
And now, finally, a word or two about some of the outstanding mechanical features common to all the class in their hey-day. The cylinder


6½" x 3⅜"
A
B
3⅛"
1¼
6¾" x 3⅜"
2¼"
1⅛"
4"
1½"

Left : *The old coupling-rods were black as far as the line AB. The end was polished. The newer fluted rods were entirely bright.*

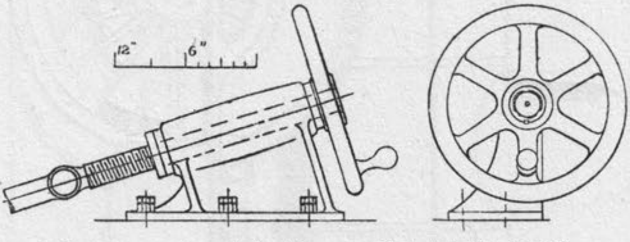


Right : *The Webb whistle.*


PORTS : 1½" & 3¼" X 14"
VALVE SPINDLE 1 IN 9
2'·6½"
6½"
LINK 1'4"
REV. ROD 11'-1"
5'·11" CONN. ROD.
4'·0" FORE EXC.
24" STROKE
5½" THROW
1" OFFSET
HORIZONTAL
FULL TRAVEL 4¼"
LAP 1⅛"
LEAD ⅛"
9¾"
1'·2¼"
1'·0¾
1'-10"
57°
½"
1½"
5¼"
3¼"
4'·0" BACK EXC.
12° FORE EXC.
24° BACK EXC.
1'
4'·2¼"

The layout of the "Precedents'" straight-link valve-gear is worthy of detailed study. The 1 in. offset was a curious feature, also used by Stirling in his "eight-footers."

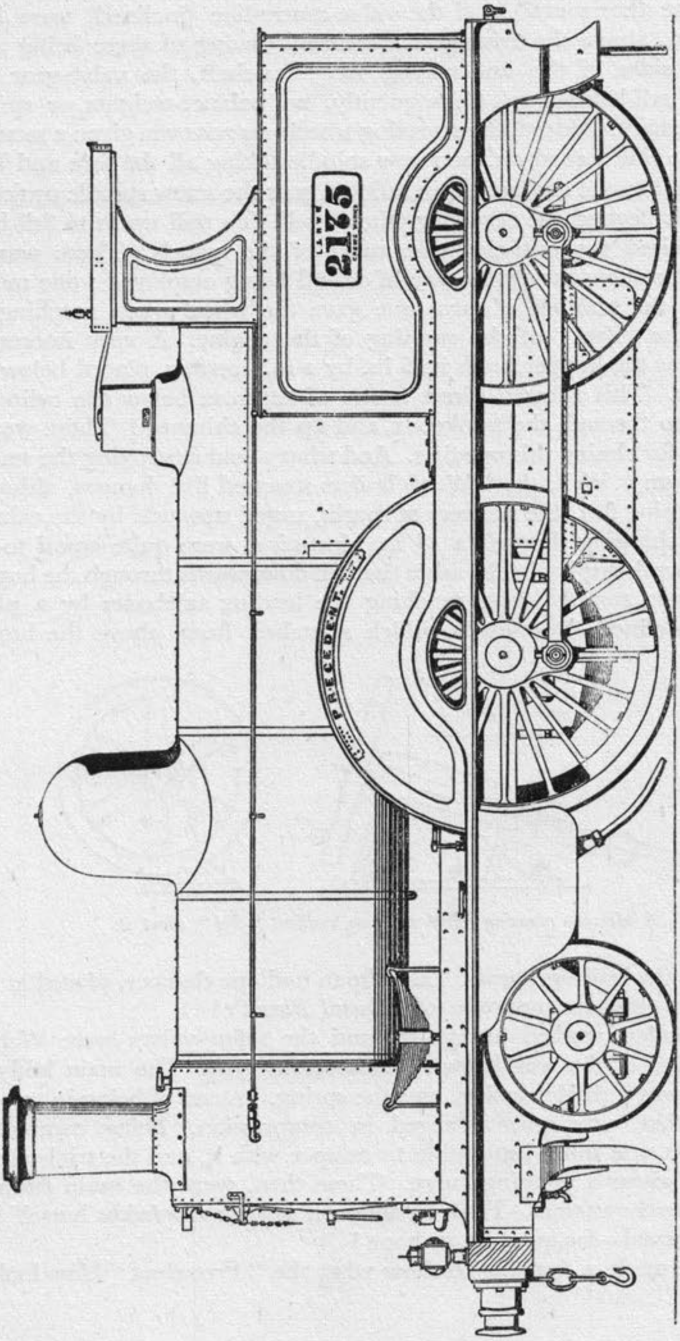
centre-line (horizontal) and the valve centre-line (inclined) were both offset 1 in. above the driving-axle centre. Owing to there being arms on both sides of the under-hung weighbar-shaft, the valve-gear was virtually self-balancing. Consequently, no balance-weights or springs were necessary. Indeed, the reversing wheel was not even given a securing catch, the fine thread on the screw spindle taking all the fore and back thrust ! When the engine was in full fore gear the screw spindle projected backwards beyond the reversing wheel itself. To pull up in to full back gear required ten anti-clockwise turns of the wheels. There was no indicator to show the percentage of cut-off being employed ; one merely relied on the number of turns one gave the wheel when notching up and on the " feel " of the running of the engine. A very interesting feature was the hopper, with its 6 in. by 2 in. opening, placed below the smokebox. This allowed direct access of air from below the cylinders, straight up through the smokebox, and up the chimney ! There was no provision for closing this opening. And what about destroying the smokebox vacuum ? Well, these Webb boilers steamed like demons, although when running fast, the showers of sparks, urged upwards by the exhaust steam discharging through a 4¾ in. blast-pipe, were quite equal to the finest firework display ! The ashes that fell downwards through the hopper mouth were stopped from reaching the leading axleboxes by a plate, slightly inclined downwards, which stretched from above the hopper mouth to the leading horns. The ashpan had one damper, placed at the front end,—just the opposite of *Edward Blount's* !



A pleasant reversing wheel with an excellent " feel " about it.

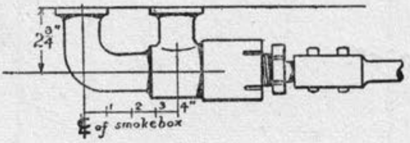
The boilers worked at 150 lb. and the safety-valves were Webb's modification of the well-known Ramsbottom type. The main body of the valve was a single casting, and the spring, instead of being in tension as heretofore, was now arranged in compression. Being completely enclosed, it was quite impossible to tamper with it, and the trial-release lever was given a pleasing curve. These then, were the main features of these lovely engines. How fortunate it is that *Hardwicke* herself has been preserved—for ever, let us hope !

I have made a drawing to show what the " Precedent " class looked


L.N.W.R.
2175
PRECEDENT

This is how "Precedent" looked when new in December, 1874.

like when brand new—that is, what I should term, "phase 1." Not so very different from *Hardwicke*, you may think on first inspection. And yet a second scrutiny reveals some little touches which I hope may take the L.N.W. enthusiast back to the days when the black engines, which we all knew so well, were making their first appearance on the premier line. In dimensions there was little that was different. The outstanding one was that of the wheels, at first only 3 ft. 7½ in. and 6 ft. 7½ in. respectively in diameter. This was due to the thinner tyres originally fitted. In turn this lowered the footplate above the rail down to 4 ft. 0½ in. and the boiler centre-line likewise to 7 ft. 4¾ in. It was a strange Crewe custom that wheel diameters were only quoted to the nearest 3 in. Thus the "Precedent" were "six-foot-six engines," although not one of the gallant 166 ever had wheels that size!

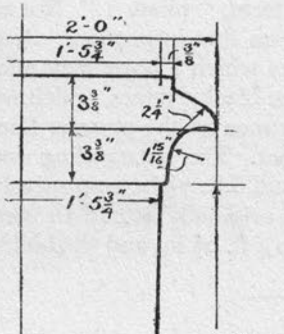


Plan of blower-valve, which was placed on the left-hand side smokebox.

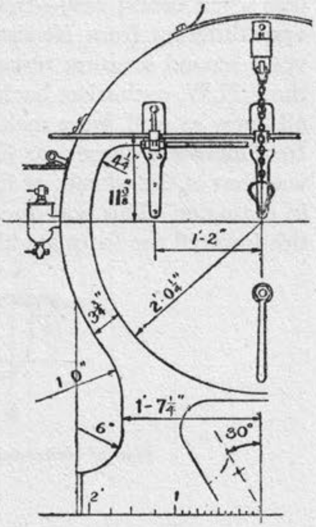
From the model-maker's point of view there is much to be said for "phase 1" appearance of these first 70 engines. Apart from the historic aspect that I have already mentioned, there was a simplicity which seemed in some manner to set off the beautiful proportions of our old friends particularly well. I like the handrail higher up on boiler side. Do you notice that the driving splasher carries no shield—the splendid piece of gay heraldry which the impious dubbed a "cauliflower"? But after No. 890, *Sir Hardman Earle*, was turned out, Webb added this decoration to his black livery in 1877. The initials L. & N.W.R. and words "Crewe Works" on the number plate were painted over with the red of the background; later they were left in polished brass.

The blower valve was originally on the driver's side of the smokebox, his handrail being continued forwards to actuate the same. This valve was something like the standard cast-iron one of later days, but its gland was of polished brass with four turning slots in it. The gland nut which screwed into it was also polished.

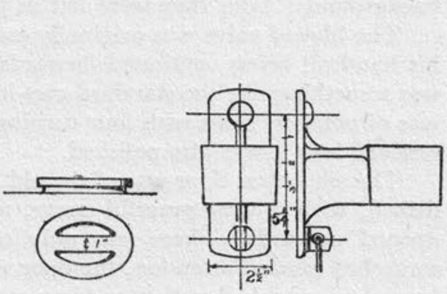
The smokebox door was of the old Ramsbottom type. It was slightly dished, with a very graceful curve, was fitted with three hinges, and opened upwards. There was only one fastening handle. When the smokebox needed attention, the door was held well above the horizontal by a chain attached to the top lamp socket. I often wondered why Webb changed this type of door. It was simple and convenient. Anyhow, he


2'-0"
1'-5¾"
⅜"
3⅜"
2¼"
3⅜"
1 15/16"
1'-5¾"
2'-4"
1'-4"
4¼"
12"
2'-4"r

The Webb chimney cap had the unusual refinement of an undercut moulding with a radius of $1\frac{15}{16}$ *in.*


4½"
11⅝"
1'-2"
2'-0¼"
3¾"
1'0"
1'-7¼"
6"
30°
2'
1

The Ramsbottom door as fitted to the "Precedent" class.



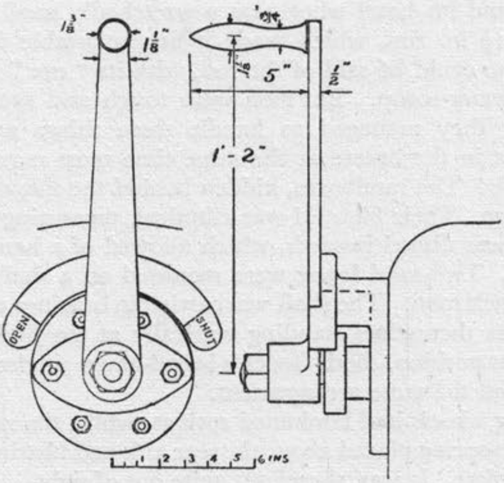
Standard sand-box lid, and top lamp socket for smokebox.

used it for the first twelve years of his rule at Crewe at least, and it had served previous to that for another fourteen years! At the base of the chimney was a round plug type of lubricator for supplying oil to the regulator valve, which was situated in the smokebox. These lubricators disappeared also about the same time as the abolition of the old smokebox door. Another link with the past was the chain and hook fitted to the front buffer-beam hook. This also was the same as those fitted to the Ramsbottom engine. Needless to say, there was no front vacuum hose-pipe—there wasn't even any brake on the engine itself! It seems likely that the fireman must have had a hard time of it when trying to hold his train by the tender brakes alone, for these had only very slight wooden brake blocks and his hand wheel was a wretchedly small 13½ in. affair with a thick 1½ in. rim, which made it uncomfortable to manipulate. Much the same could be said of the rod, with its " eye " at the end for working the water-scoop. But men were tough and speeds were low, although how they managed to handle these things and keep their bowler hats on in the breeze at the same time must remain one of the mysteries of life! The sandboxes, hidden behind the shapely outer plate, were quite large. Their filler lid was elliptical, measuring 8 in. by 6 in. by ¾ in., and was dished inwards, which allowed of a handle being cast across the top. Two sand levers were mounted on a shaft in the cab—one lever for each man. The shaft was carried in bearings cast on the fire door, the levers themselves standing vertically at the firebox sides in a very convenient position. Both Gooch's broad-gauge singles and Stirling's eight-footers had the same arrangement.

The driving wheels had laminated springs, whilst the rear pair had a transverse plate-spring placed above the rear axle and bearing on a casting below the footplate. It was, therefore, quite out of sight.

And now, how do you like my beauty? As much as I do, I hope, and we only need a drawing of the tender to complete what must necessarily be a short description of one of the finest classes of locomotive ever built.

How often I have thought what fun it would be to write a complete volume about some particular locomotive. Such a book could be planned as follows : Introduction, reasons for the design, technical details—these might run into thousands (phew!)—and, as grand finale, anecdotes concerning the chosen one's career. Add a few hundred drawings, and these make the perfect article! But engine history is long and life is short, declares the old saw, and there is only time to spare to mention a few more items of mechanical interest, and to describe the tender which accompanied *Hardwicke* in her later and immortal feats of speed. First of all, the regulator handle—that vital lever of the iron horse. An elegant thing, with a pleasant 5 in. handle, around which the hand closed with a feeling of ease, except when the regulator valve in the smokebox jammed—then, indeed, a case of "all hands to the pump" I once turned up a full-sized model in wood, and went a-Hardwicking with the thing in my hand, and with my head full of August 22nd, 1895, and the Shap gradient!—a great experience, I can assure you. Next the reversing wheel. There was a particular "feel" about a Webb wheel. It turned very smoothly, and its thick circular 1½ in. rim and the little ball-headed handle were both nice to the touch. I used to think, as I lovingly fingered them, how very familiar those same impressions must have been to hosts of the great engine drivers of the old days—Ben Robinson, Leigh Bowden, David Button and Jesse Brown, to mention but a few of the experts.

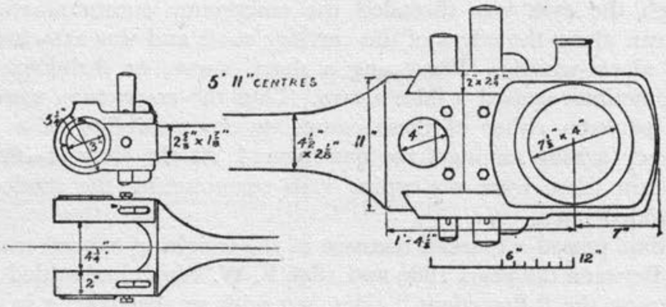


The regulator handle which started and ended many a famous run.

It was nice to receive the same impressions oneself! To tread, as it were, in the footsteps of the giants of yore. This sharing of tradition is a wonderful thing and, of course, a marked characteristic of our race. One of these days I shall build a summerhouse in the form of *Hardwicke's* cab, and sit on the side splasher, drinking tea with good loco-modeller pals the while, and anon looking out over the side panels to see if the guard is giving me the "right-away"!

The Jumbo's connecting-rod was a standard fitting; the big-end with two cotters struck one as a big affair. The forked small-end was introduced in the far-away days by Alexander Allan, when Crewe first began to build engines, and it has remained with the L.N.W. ever since. Plenty can still be seen on the "coal-tanks" yet running.

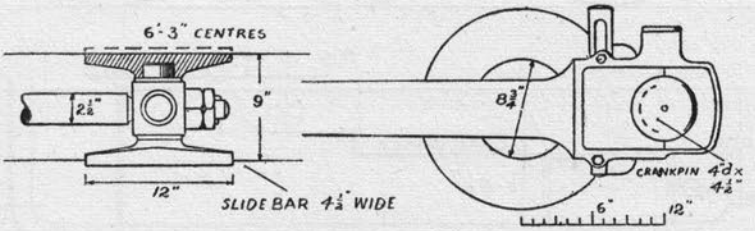
The crosshead was bored taper to receive the piston-rod and two



Standard L.N.W.R. connecting-rod with traditional " small-end."

cylindrical lugs, top and bottom, held the pair of 12 in. slippers, two slide-bars only being employed on the " Nor'-West." In general design too, the tender belonged to the years when Allan and Trevithick reigned at Crewe. With a total wheelbase of only 12 ft. 6 in. and weighing but 12 tons 2 cwt. empty and 25 tons loaded, it was a remarkably small thing for a locomotive to drag about. That was largely thanks to the Ramsbottom water-scoop (introduced in 1862) which enabled them to keep their 1,800 gallons of feedwater replenished en route. The frames were made of wood, one of the reasons for this being the theory that in the event of a collision the tender would smash up first, thus acting as a kind of buffer betwixt engine and carriages.

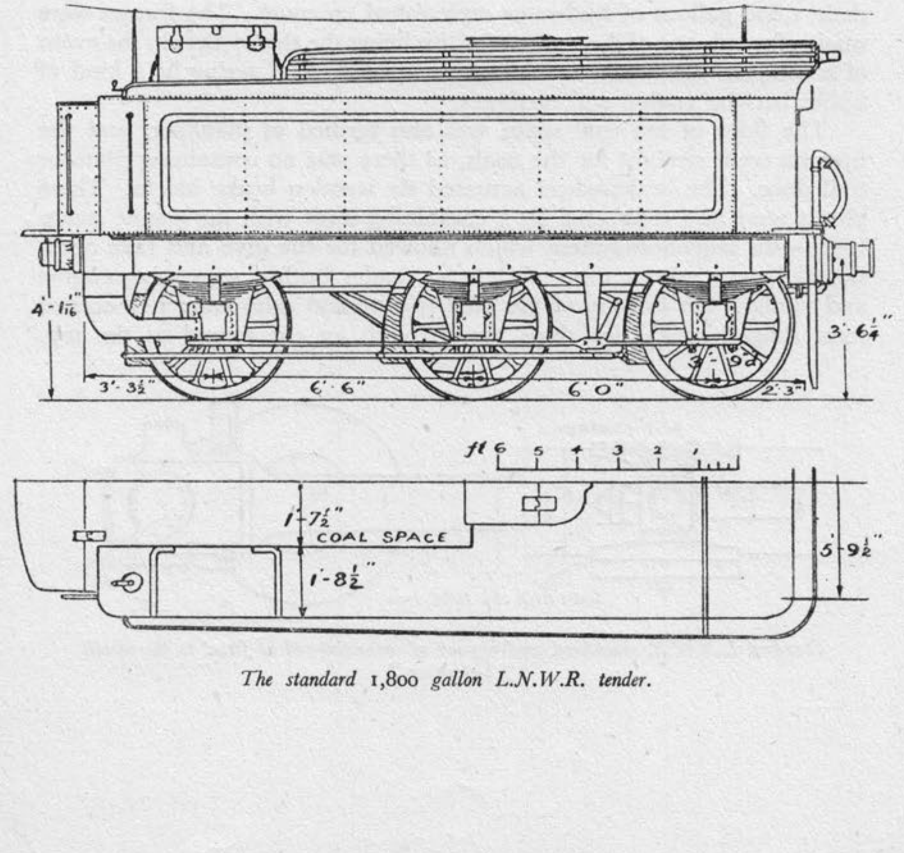
The floor of the coal space was also formed of planking, and the fireman went straight for the coals, as there was no containing plate or coal door. The brake-wheel actuated six wooden brake blocks. These blocks were also connected by a combining lever with the engine steam brake—an ingenious system which allowed for the give and take occasioned by the compression of the two tender buffers separating engine and tender. On the top of the tank (right-hand side) were two curved rods, shaped much like ships' davits, with an eye forged at the top.



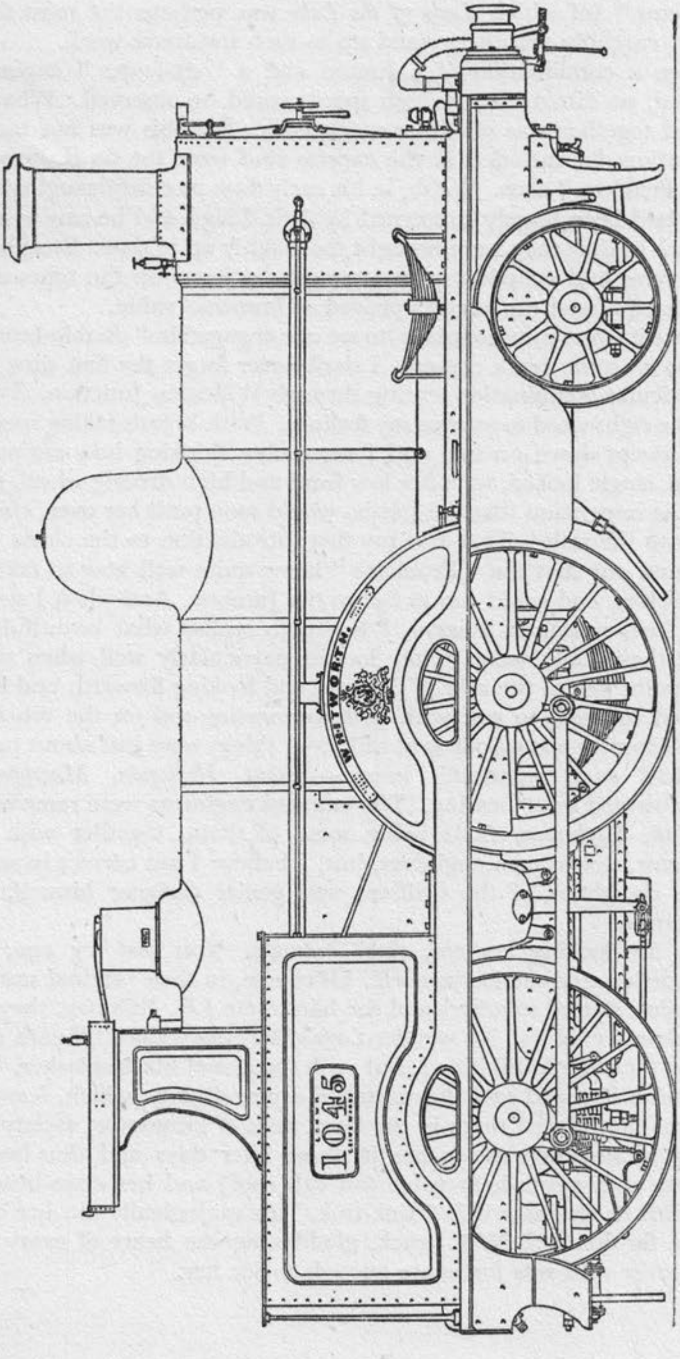
Standard L.N.W.R. cross-head, and big-end of connecting-rod as fitted to the rebuilt " Stephenson."

Through the eyes was threaded the emergency communication cord which ran along the edges of the carriage roofs and was attached to the engine alarm-whistle. Traversing a sharp curve, or shrinkage due to rain, sometimes caused a false alarm. Thus the enginemen were left to choose between either of these causes or the possibility of a genuine emergency arising amongst the passengers! At the time of *Hardwicke's* record run there were no coping rails surmounting the tender, these being added later.

As time passed a marked increase in the weight of express trains took place. Between the years 1889 and 1896 F. W. Webb had added another 90 sisters to the "Precedent" class, but with smaller 6 ft. 3 in. driving wheels. These were known as the "six-footers." They were slightly more powerful than the earlier engines, and seemed fully possessed of the same wonderful turn of speed. These 256 locomotives were the major part of the main-line engine stock, and as the trains became heavier and heavier "piloting" or "double-heading" became more and more the order of the day. Indeed, it became the usual thing to see a Jumbo headed by a "six-footer" or else by one of John Ramsbottom's



The standard 1,800 *gallon L.N.W.R. tender.*


WHITWORTH
1045
CREWE WORKS

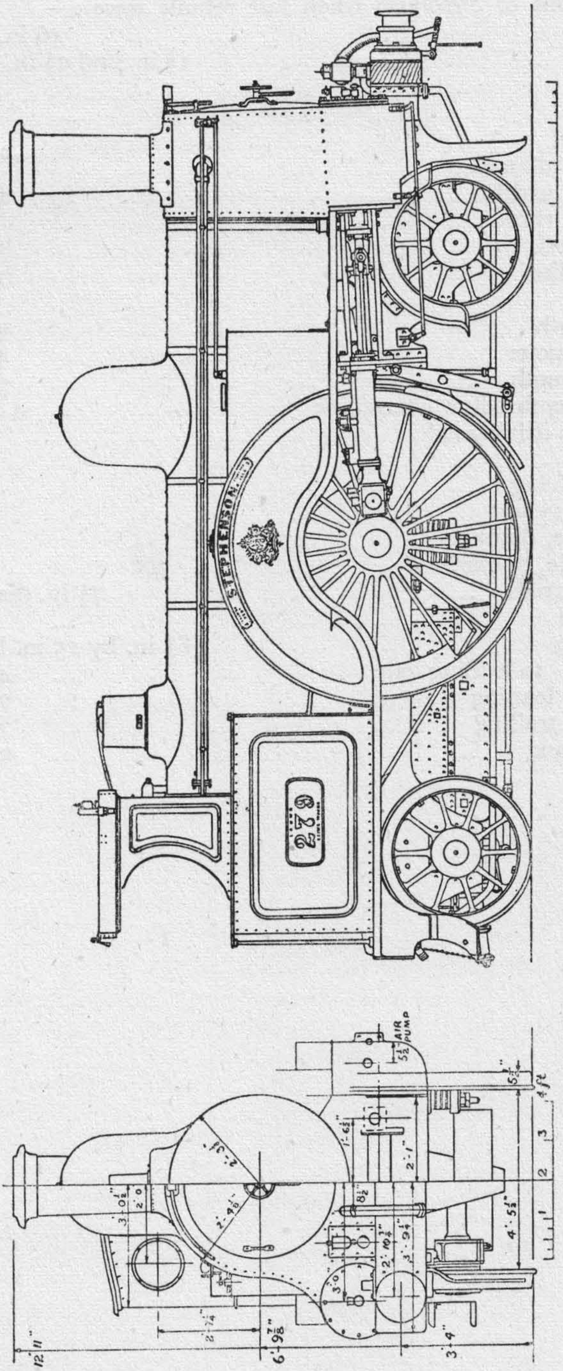
The smaller six-foot version of the "Precedents" appeared in September, 1889.

"Problems" (of which *Lady of the Lake* was perhaps the most famous engine), carefully rebuilt to stand up to such strenuous work.

When a combination of a Jumbo and a "six-footer" engine was employed, no diminution in high speeds could be observed. What they achieved together was oft-times marvellous. But this was not the only combination, for included in the express stud were the 60 Ramsbottom 2-2-2 "Problem" class. Webb, in his early days as chief draughtsman at Crewe, had been largely concerned in their design and he saw to it that from time to time they were brought thoroughly up to date. Steel boilers, thicker tyres and cylinders were amongst the items on the renewal list, and thus equipped the engines proved of immense value.

Hence it was a commonplace to see one engaged in "double-heading" a Jumbo on some crack express. I shall never forget the first time I saw this particular combination tearing through Willesden Junction. Tearing is just the right word to express my feelings. With breath-taking speed the engines swept down on me, and I remember thinking how curious the 7 ft. 6 in. single looked, with her low front and high driving wheel, rather giving the impression that the Jumbo would soon push her over, chimney first, on to the rails! That was my first introduction to the class. But I soon found out that the "Problems" knew quite well how to take care of themselves, and could run as fast as the Jumbos. And when I saw one face to face, resting in Euston, I began to realise what beautiful locomotives they really were. They looked particularly well when viewed from a point just to the rear of the cab, and looking forward, and if they happened to come to rest with their connecting-rod on the top centre and the observer was standing at rail level, things were just about perfect. They had such wonderful names—*Erebus*, *Harlequin*, *Mazeppa* and *Majestic* wanted some beating. The eminent engineers were remembered too—*Watt*, *Stephenson*, *Locke* being some of them, together with *Edith* and *Eleanor*, not women engineers, but, I believe I am correct in stating, the two daughters of the brilliant and genial designer himself, John Ramsbottom.

Yes, fine-looking engines, right enough. You just try one, good loco-modeller, and see for yourself. Of course, in their original state, i.e. green paint, slatted splashers and the handsome J.R. chimney, they were indeed dainty engines. No wonder *Lady of the Lake* walked off with a gold medal at the 1862 Exhibition! But with the closed black splasher, Webb boiler mountings and cab, they assumed a new dignity, which, I am bold enough to say, placed them in the front rank of locomotive society. My drawing of *Stephenson* shows her in these later days and thus bedight. Complete with steam-heat valve (on cab roof) and her cross-head air-pump with its characteristic "tink-tink," she majestically ran her course over the far-famed L.N.W. track, gladdening the heart of every locomotive lover who was fortunate enough to see her.


STEPHENSON
279
12' 11"
6' 9 7/8"
3' 4"
3' 0 1/2"
2' 0
2' 4 5/8"
1' 6 1/2"
2' 1"
8 1/2"
3' 9 1/4"
3' 0"
4' 5 1/2"
5 1/2"
AIR PUMP
4 ft
1
2
3

An excellent little "single-wheeler" with all the best characteristics of the L.N.W.R.

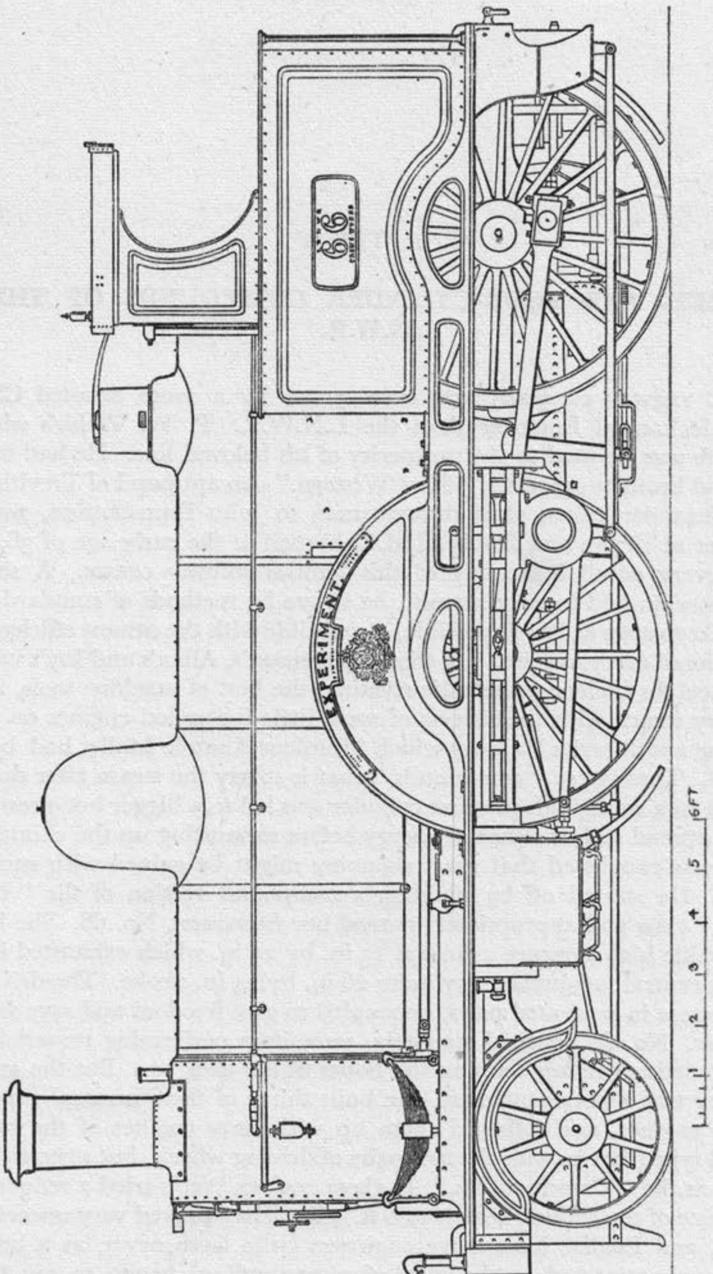
The dimensions of *Stephenson* when last rebuilt were :—

Cylinders	16 in. by 24 in.
Ports	1½ in. and 3¼ in. by 13½ in.
Lap	1 in.
Lead	5/32 in.
Valve travel	3¾ in.
Eccentrics, diameter	13 in.
,, width	2 13/32 in.
,, throw	5 in.
Eccentric-rods	3 ft. 10 in.
Expansion link	1 ft. 3 in.
Lifting link	6 in.
Boiler, length	9 ft. 9⅞ in.
,, diameter	4 ft. 2 in.
Firebox, length	5 ft. 5¼ in.
,, depth below centre line	4 ft. 10⅞ in.
,, to driving axle	1 ft. 8 in.
Pressure	150 lb.
Wheels, driving	7 ft. 9 in.
,, carrying	3 ft. 9 in.
Driving axle, diameter	7 in.
Leading axle, diameter	6 in.
Driving journals	7½ in. dia. by 8 in.
Blast nozzle	4¾ in.
Buffer-beam	6¼ in. by 15 in. by 78½ in.
,, to leading axle	4 ft. 0 in.
Wheelbase, leading	7 ft. 7 in.
,, trailing	7 ft. 10 in.
Rear overhang	2 ft. 6 in.

CHAPTER V

THREE- AND FOUR-CYLINDER COMPOUNDS OF THE L.N.W.R.

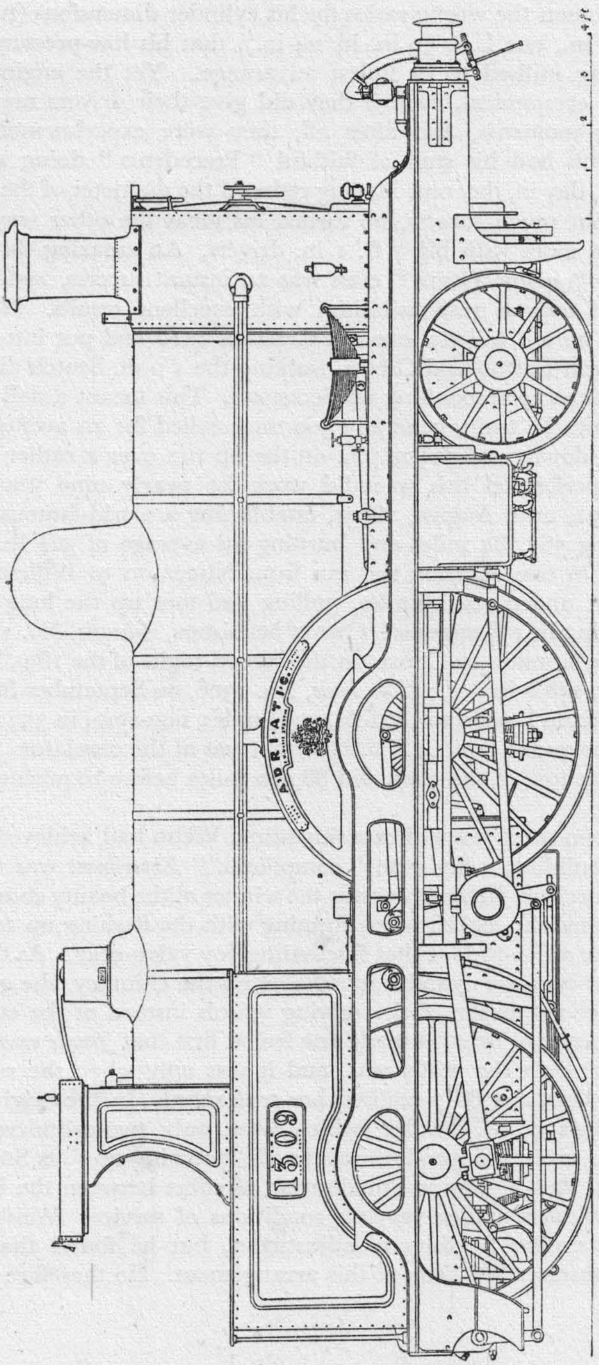
NO railway company was ever served by a more devoted Chief Mechanical Engineer than the L.N.W.R. F. W. Webb's whole life was devoted to the prosperity of his beloved line. He had been bred and brought up on the " Nor' Western." An apt pupil of Trevithick and Alexander Allan, chief draughtsman to John Ramsbottom, works manager at Crewe and finally C.M.E. himself at the early age of 36, he knew every detail intimately of this famous railway centre. A strict disciplinarian and keen economist, he strove by methods of standardisation to keep costs as low as possible, compatible with the utmost efficiency. He explored every avenue. He tried Stephenson's, Allan's and Joy's valve gear, steel for boilers, pneumatic riveting, the best of machine tools, and was very struck with the success of some little 6-coupled engines on the Bayonne and Biarritz Railway which Monsieur Anatole Mallet had built in 1878. These were " compounds," that is to say the steam after doing its work in a small high-pressure cylinder was led to a bigger low-pressure one to expend its last ounce of energy before exhausting up the chimney. Webb was convinced that great economy might be gained with such a system. He started off by building a compound version of the " Precedent " class and appropriately named her *Experiment*, No. 66. She had two outside high-pressure cylinders 13 in. by 24 in. which exhausted into one big central low-pressure cylinder 26 in. by 24 in. stroke. The driving wheels were in separated pairs, uncoupled to give freedom and save wear and tear. No. 66 behaved strangely, sometimes performing remarkably well, sometimes rather dashing the hopes of her designer. But the great engineer was a persistent man. He built thirty of these unusual experimental engines, and followed them up with forty engines of the same general type (that is, with the two pairs of driving wheels, but uncoupled) known as the " Dreadnoughts." In these engines Webb tried a reduction in the size of the driving wheels to 6 ft. 3 in. They proved very uncertain indeed, and English locomotive engineers (who have never, as a body, been much attracted to the idea of compounding) began to say that


EXPERIMENT
66
1
2
3
4
5
6FT

The first of the Webb three-cylinder compounds.

Webb had chosen the wrong ratios for his cylinder dimensions (two H.P. 14 in. by 24 in., one L.P. 30 in. by 24 in.), that his low-pressure steam was not being utilised to its fullest advantage. Yet the engines were undoubtedly economical, even if they did give their drivers many wild and exciting moments, and after all, they were experimental. Why worry? Webb had his stud of faithful "Precedents" doing splendid express work, day in, day out. Having reduced the diameter of the driving wheels without much success, he turned his ideas the other way round and built ten more with big 7 ft. 1 in. drivers. An amazing thing happened. The "Jeanie Deans" class was an instant success, and took its full share of express responsibilities with excellent results. No. 1304 *Jeanie Deans* herself was stationed at Camden Shed and put into regular service between Euston and Crewe, working the 2 p.m. Scotch diner and returning on the corresponding up Scotsman. This meant a daily run of 320 miles, and the train, generally 300 tons, called for an average speed of 50 m.p.h. down, and 52½ m.p.h. on the up run over a rather difficult road. She performed this splendid work for nearly nine years (from January, 1891, until August, 1899), establishing a world-famous reputation, covering 567,784 miles and burning an average of 32½ lb. of coal per mile! On one occasion she ran from Nuneaton to Willesden, 91½ miles, in just under 102 minutes, pulling 326 tons up the long 15 mile ascent to Tring in 17¾ minutes! One of her sisters, *Adriatic*, No. 1309, ran the trip from London to Crewe on the record night of the 1895 Race-to-the-North in 148 minutes, whilst *Ionic*, No. 1306, on September 8th, 1895, ran the trip from Euston to Carlisle, 299¼ miles, non-stop, in 353 minutes. On this occasion the famous Ben Robinson was at the regulator. *Teutonic*, No. 1301, the first of the class, did 88,000 miles before requiring general overhauling.

So in seven short years of experimenting, Webb had achieved his aim as regards building a first-rate "compound." *Experiment* was a lovely-looking engine, but *Jeanie Deans* was the winner of the beauty competition. How handsome she looked when running with the flashing up and down motion of the valve-rods of that fascinating Joy valve-gear! As there was only one low-pressure cylinder to exhaust up the chimney, she gave only two puffs per revolution of the driving wheels instead of the customary four. This unusual exhaust made one feel at first that *Jeanie* was running much slower than she really was, and it was only when she rushed by with a roar that one fully realised her true speed. In the original compound engines of M. Mallet (which were only two-cylindered) each cylinder was given independent means of "notching-up" its Stephenson link motion, thus aiming at equalisation of effort between the H.P. and the L.P. cylinders under varying conditions of service. Webb at first provided a similar freedom of adjustment, but he found that drivers availed themselves but little of this arrangement. He therefore gave the


ADRIATIC
1309
1
2
3
4 ft

"Adriatic" as she ran her record trip to Crewe in the 1895 Race to the North.

"Jeanie Deans" class the usual sets of Joy valve-gear for the outside high-pressure cylinders, but for the inside low-pressure cylinder he provided a loose single-eccentric which, of course, was incapable of variation of cut-off. The little cylindrical fitting at the base of the chimney was a small relief-valve which limited the pressure of steam passing to the low-pressure cylinder to 80 lb. per sq. in. The big 30 in. low-pressure cylinder piston was guided by a 2½ in. tail rod. No cover for this tail rod was provided, but the foot plating was continuous over the long 6 ft. 4½ in. front overhang of the main frames. The polished steel circular disc at the end of the outside slidebars was, of course, the bracket holding the curved slot of the Joy valve-gear. The 7 in. diameter driving axle bearings had the unusual length of 13½ in. This helped to prolong the running periods between visits to the shops.

Useful Dimensions of Webb Compounds

	Experiment	*Jeanie Deans*
Wheels ...	... 6 ft. 9 in. and 3 ft. 9 in.	7 ft. 1 in. and 4 ft. 1½ in.
Wheelbases ...	... 9 ft. 4 in. and 8 ft. 3 in.	8 ft. 5 in. and 9 ft. 8 in.
Overhangs ...	... 2 ft. 4 in. and 4 ft. 1 in.	6 ft. 4½ in. and 4 ft. 3 in.
Centre line of boiler	7 ft. 5½ in.	7 ft. 10½ in.
Top of chimney ...	13 ft. 1½ in.	13 ft. 1¼ in.
Length of chimney	3 ft. 3 in.	2 ft. 10 in.
Length of boiler ...	9 ft. 10 in.	11 ft. 0 in.
Length of firebox ...	5 ft. 5 in.	6 ft. 10 in.
Cab pillars apart ...	6 ft. 4 in.	6 ft. 4 in.
Width over footplate	7 ft. 10½ in.	8 ft. 2 in.

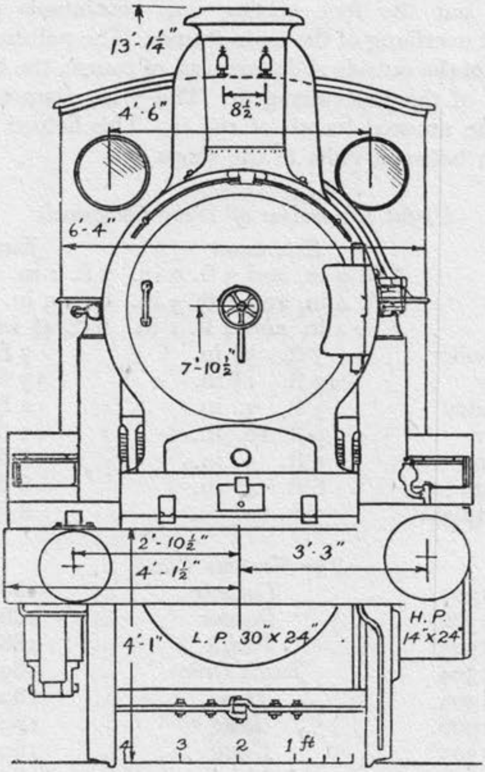
The Teutonic Class

1301	...	*Teutonic*	...	1889
1302	...	*Oceanic*	...	1889
1303	...	*Pacific*	...	1889
1304	...	*Jeanie Deans*	...	1890
1305	...	*Doric*	...	1890
1306	...	*Ionic*	...	1890
1307	...	*Coptic*	...	1890
1309	...	*Adriatic*	...	1890
1311	...	*Celtic*	...	1890
1312	...	*Gaelic*	...	1890

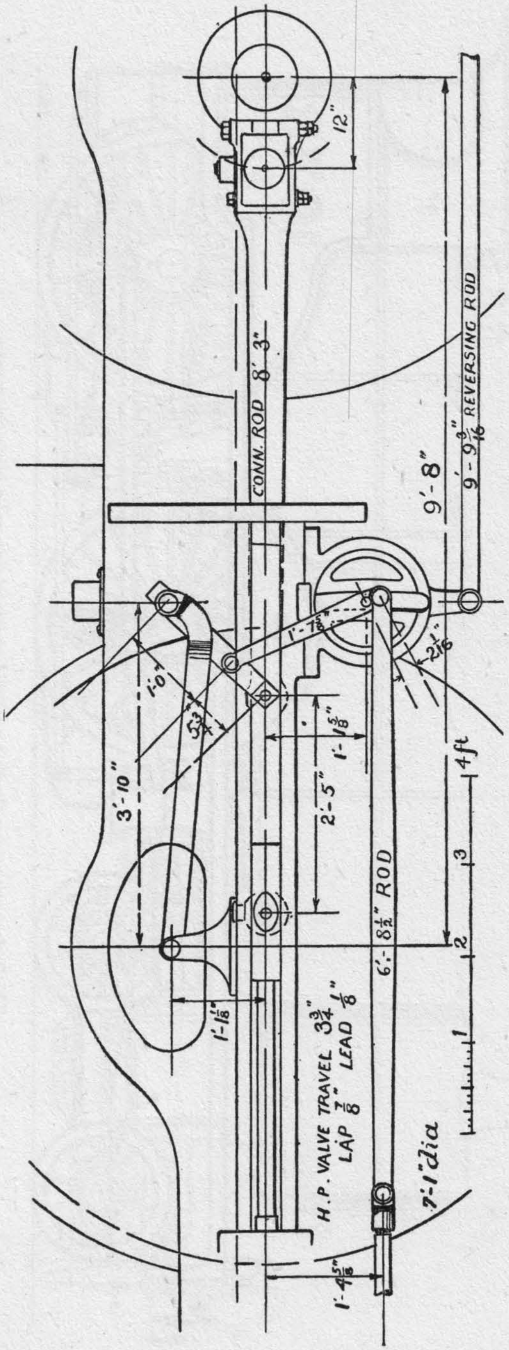
Jeanie Deans received her name as a compliment to the Scottish people when she was exhibited at the Edinburgh Exhibition of 1890.

The *Teutonic* class had only been running two years when a new compound engine appeared on the North Eastern Railway. This was the famous No. 1619, designed by Wilson Worsdell. She, too, had large driving wheels, 7 ft. 1½ in. in diameter, but they were four-coupled ones, and, moreover, she had only two cylinders, 20 in. and 28 in. by 26 in.

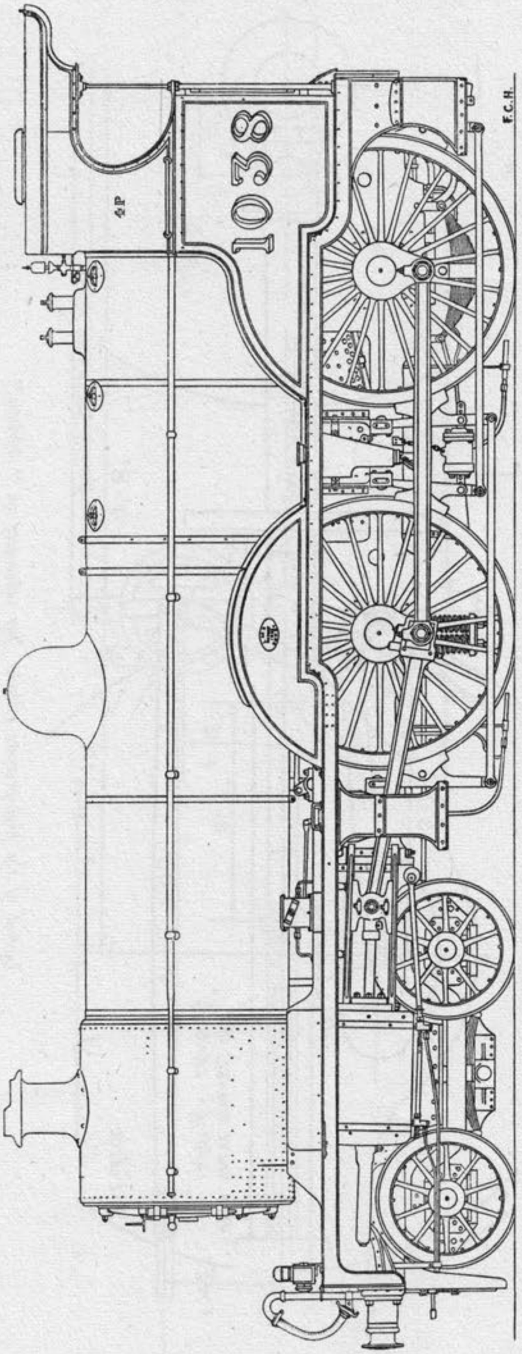
stroke. On regular turns with her ten sisters, which were simple engines, she burnt only 30.38 lb. of coal per mile as against their consumption of 33.35 lb. The compound engine was doing well. Again in 1898 this engine was rebuilt to the plans of W. M. Smith, of Gateshead, as a three-cylindered compound, with her cylinders arranged exactly in opposite manner to the Webb engines. No. 1619 now had one inside H.P. cylinder, 19 in. by 26 in., which exhausted into the two outside L.P. cylinders of 20 in. diameter by 24 in. stroke. In this form she was highly successful and was, indeed, the prototype of the famous Midland Railway compounds. Her high boiler pressure, 200 lb., was a sound feature of this very handsome engine. She could haul enormous loads and had many high speed runs to her credit. The next year the four-coupled compound appeared on the L.N.W.R.—Webb had by now abandoned the single-



The front view of "Adriatic" reveals the enormous L.P. cylinder placed in between frames.

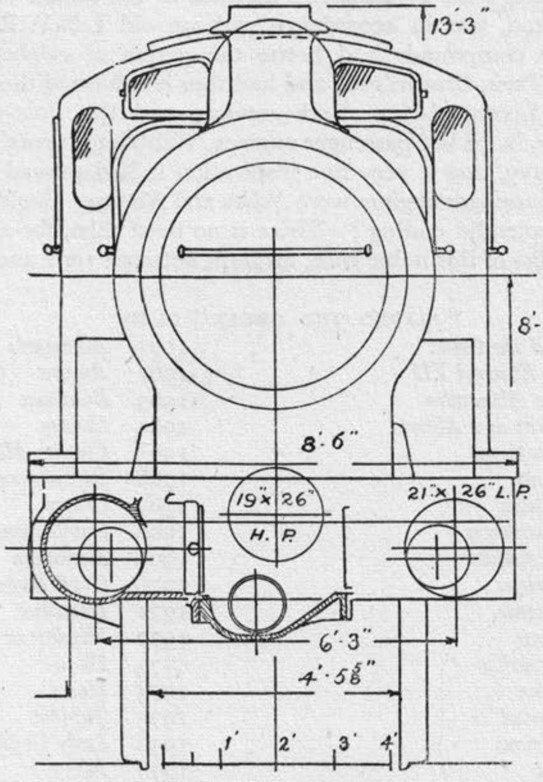

12"
CONN. ROD 8' 3"
9'-8"
9'-9 3/16" REVERSING ROD
1'-7 5/16"
2 1/16"
1'-0 7/8"
5 3/4"
3'-10"
1'-1 5/8"
2'-5"
6'-8 1/2" ROD
4 ft
3
2
1
1'-1 1/8"
H.P. VALVE TRAVEL 3 3/4"
LAP 7/8" LEAD 1/8"
7'-1" dia
1'-4 5/8"

Layout of the high-pressure cylinder Joy valve-gear on "Adriatic."



The Deeley engines were the most successful compounds in regular use in this country.

wheeler type. He built 80 such engines ; they all had two H.P. and two L.P. cylinders—the latter placed inside. The valves were actuated by two sets of Joy gear only, the H.P. valve motion being derived from the L.P. valve spindles by horizontal levers placed at the front end. Of the first 40 engines, No. 4000, *La France*, was exhibited at the Paris Exhibition of 1900, whilst the later 40 locomotives, with their bigger boilers, looked most imposing. My own introduction to this fine class of Webb compounds was a very thrilling one. Standing on a platform of Willesden Junction, and close to the overhead railway bridge, an express train, headed by one of these big engines, approached at great speed. With a fearsome roar, *Hannibal* tore past, and I shall never forget the impression her whirling connecting-rods made on me ! As she plunged under the bridge, showers of sparks and clouding steam shrouded this wild fury, and a moment later flashing red tail lights quickly receded into the



In this compound the H.P. cylinder is in the middle—the reverse of the Webb system.

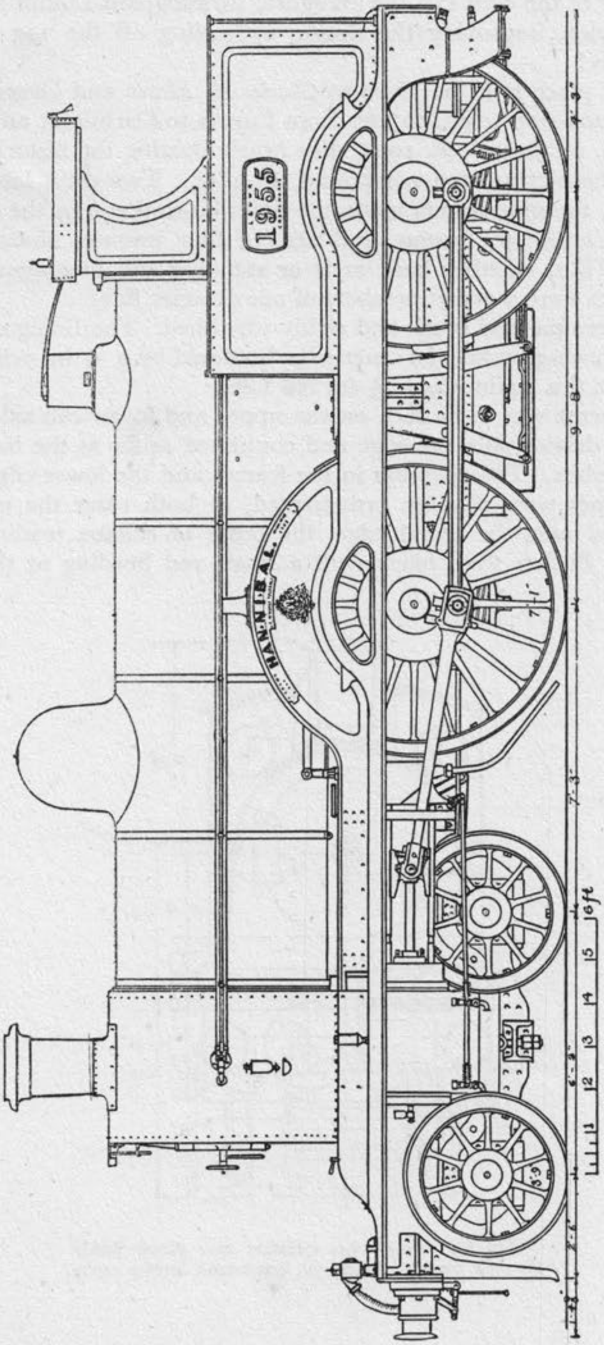
distance. Magnificent indeed! There was much romantic charm about these engines. How impressive they appeared as they majestically came to rest at No. 2 arrival platform at Euston! They were the biggest of Webb's engines and seemed to loom up larger and larger after seeing so many of the little " Precedents " and " Problems " that used to frequent the dear old terminus.

What wonderful names they had, too, such as *King Arthur*, *Nelson*, *Jupiter*, *Illustrious*, the last reminding one of the fact that a high proportion of the 80 engines were given names glorious in the annals of the Royal Navy. This, too, was in accordance with an old L.N.W.R. tradition. For years the compounds had borne the names of celebrated liners, *Oregon*, *City of Paris*, *Oceanic*, etc., and had thus emphasised the connection between the Liverpool-New York services and the boat-trains from London. Now, in his last passenger engines, Webb had turned for inspiration to the Navy, and a very fine inspiration it had proved to be. His very last two passenger engines were *Nelson* and *Neptune*. Could there have been a more splendid ending? There is no need then, for an excuse to give here the list of this noble race, all built between 1901 and 1903.

"ALFRED THE GREAT" CLASS

1941	*Alfred the Great*	1961	*Albemarle*
1942	*King Edward VII*	1962	*Aurora*
1943	*Queen Alexandra*	1963	*Boadicea*
1944	*Victoria and Albert*	1964	*Ceasar*
1945	*Magnificent*	1965	*Charles H. Mason*
1946	*Diadem*	1966	*Commonwealth*
1947	*Australia*	1967	*Cressy*
1948	*Camperdown*	1968	*Cumberland*
1949	*King Arthur*	1969	*Dominion*
1950	*Victorious*	1970	*Good Hope*
1951	*Bacchante*	1971	*Euryalus*
1952	*Benbow*	1972	*Hindustan*
1953	*Formidable*	1973	*Hood*
1954	*Galatea*	1974	*Howe*
1955	*Hannibal*	1975	*Jupiter*
1956	*Illustrious*	1976	*Lady Godiva*
1957	*Orion*	1977	*Mars*
1958	*Royal Oak*	1978	*Merlin*
1959	*Revenge*	1979	*Nelson*
1960	*Francis Stevenson*	1980	*Neptune*

A good deal of romance, too, lingers round the performance of these 40 engines. For example, on September 12th, 1902, *Camperdown* ran the 299 miles from Euston to Carlisle in 322 minutes, and a week or so after *Queen Alexandra* speeded at an average of 52.3 m.p.h. non-stop, Euston to Holyhead, 264 miles in all.


1955
HANNIBAL
4' 3"
9' 8"
7' 1"
7' 3"
6' 2"
3' 9"
2' 6"
11 12 13 14 15 16ft

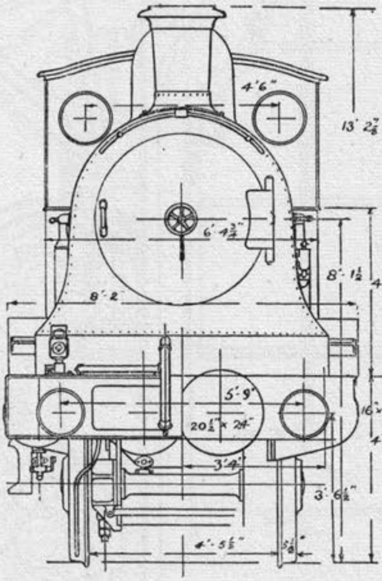
The last of the Webb compounds were majestic looking engines.

Another of the class ran the inaugural Birmingham-Euston two-hour express service, improving the timing by reeling off the 113 miles in 115 minutes!

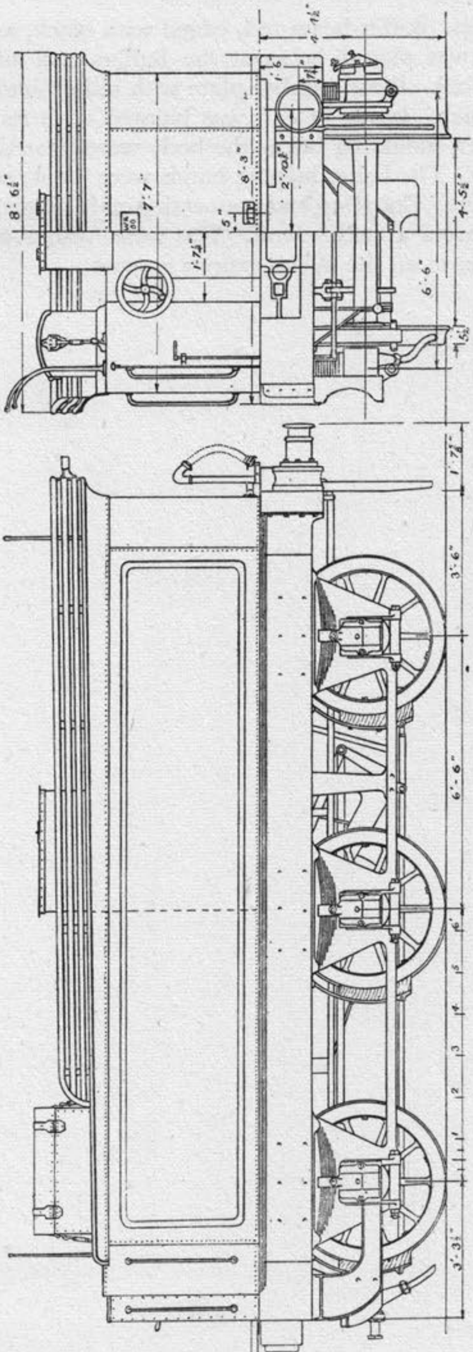
Pride of place must be given to *Charles H. Mason* and *Commonwealth*, which ran non-stop with 450 tons from Euston to Carlisle at an average of 50 m.p.h. on June 19th, 1903, thus nearly beating the historic run of *Ionic*, the three-cylindered compound, in 1895. Two days later, June 22nd, 1903, the same sisters made the first non-stop run in the opposite direction, Carlisle to Euston, and arrived four minutes ahead of the schedule. Thus, whether hard at it or standing still in majestic state, these engines were worthy members of our premier line.

They were painted black and richly varnished. The lining consisted of a $\frac{5}{8}$ in. bluish-grey line, its inner edge bordered by a $\frac{3}{16}$ in. yellow line. 1$\frac{5}{8}$ in. inside this again was a $\frac{3}{16}$ in. red line.

This scheme was to be seen on the upper and lower cab side sheets, around the driving splasher edge and continued as far as the back edge of the smokebox. The openings in the frames and the lower edge of the outside frames were likewise ornamented, in both cases the grey line being placed next the metal edge, the order of colours reading grey-yellow-red. Buffers were black with a single red beading at the outer



The two low-pressure cylinders were placed inside the main frames. A fine, fat, comfortable looking engine.


8' 6½"
7' 7"
1' 7½"
5"
8' 3"
2' 0⅜"
1' 6"
4' 1½"
4' 5½"
6' 6"
1' 5½"
1' 7½"
3' 6"
6' 6"
3' 3½"
1
2
3
4
5
6

The 2,500 gallon tender of " Hannibal " had the traditional L.N.W. wooden framing.

ends of the sockets. Buffer-beam red, edged with black, and a thin-lined black rectangle was placed between the buffers and surrounding the screw coupling-hook. Brass number plate with red ground. Guard-irons and cab roof black. Inside of cab was painted dark red. The tender panel and wooden moulding below the body were treated as in the case of the cab panels. The boiler lagging bands were black, edged each side with a fine red line. Coupling and connecting-rods bright, together with both cylinder covers at either end. The same colour scheme applies equally, of course, to all the Webb express engines.

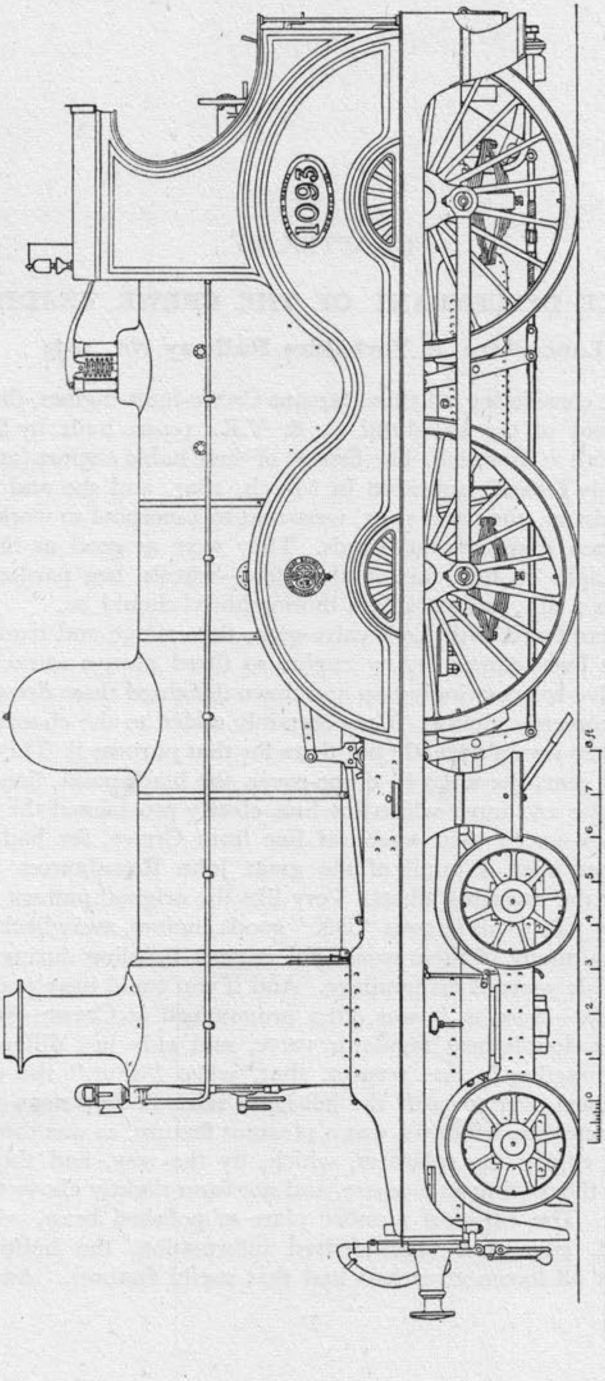
CHAPTER VI

A NOBLE DESCENDANT OF THE CREWE TRADITION

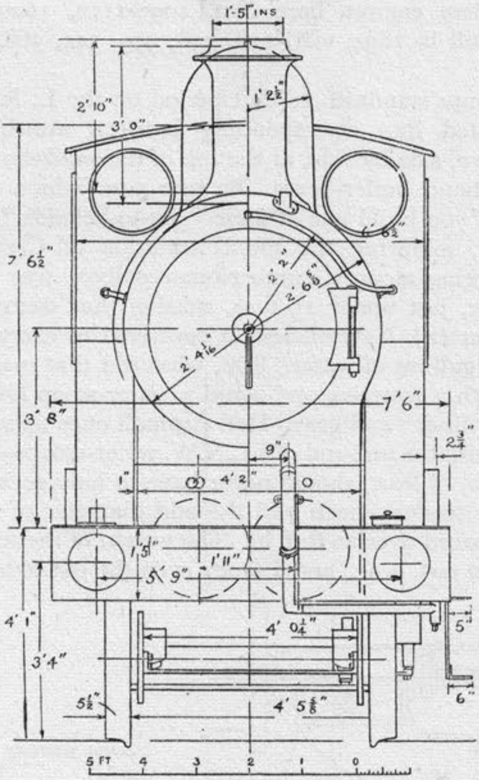
Lancashire & Yorkshire Railway No. 1093

AFTER considering all those famous Crewe-built engines, think for a moment of the delightful L. & Y.R. 4-4-0s, built by Sir John Aspinall at Horwich. The first 40 of these noble engines (and noble they certainly looked) appeared in March, 1891, and she and her two immediate sisters, 1094 and 1095, were sent to Liverpool to work express trains between that city and Leeds. They were as good as they were graceful! Light on fuel, fast on their feet—wheels, beg pardon!—and great pullers; all, in fact, that a thoroughbred should be.

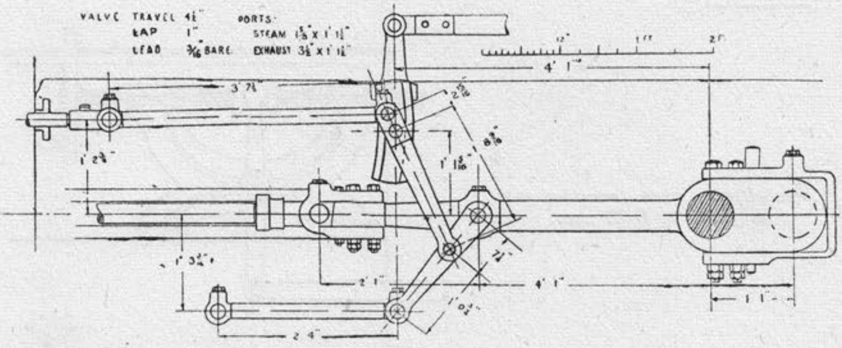
They were fitted with Joy's valve-gear, that refuge and trusty friend of the little live-steamer. Any engine so fitted always attracted one. The two valve-levers swinging up and down delighted those drawn to the poetry of geometric motion. They certainly added to the charm of 1093 (although they weren't exactly put there for that purpose!) The employment of this gear, the tall 3 ft. dome-cover, the black paint, lined with a red-cum-white and inner white fine line, clearly proclaimed the fact that these engines traced their ancestral line from Crewe, for had not the designer once been a pupil of the great John Ramsbottom himself? Just look at the reversing wheel. Very like the original pattern invented and fitted by J.R. to his famous "DX" goods engines, away back in 1858. Sir John saw many of these wonderful engines building during the first impressionable years of his pupilage. And if you could have peeped into the tall dome—*doom*, as it was often pronounced at Crewe—you could have seen a double-beat regulator valve, and only just different from L.N.W.R. practice in one respect, that, when "shut," the regulator handle reclined over towards the left-hand side. A very neat cab, with large, characteristic windows, was a pleasant feature, as was the polished brass band edging the splashers, which, by the way, had their radius struck from the driving-axle centre, and not from slightly above the same, as is usual. The elliptical number plate of polished brass, with black background, gave that much-desired information, the building date (would that all locomotives had had that useful feature). And talking


1093
0
1
2
3
4
5
6
7
8 ft

Aspinall's No. 1093 *could be truly called a " Joy-to-behold ! "*


1'-5" INS
2' 10"
3' 0"
1' 2½"
7' 6½"
1' 6½"
2' 2"
2' 6⅝"
2' 4¹⁄₁₆"
7' 6"
3' 8"
2¾"
9"
1"
4' 2"
1' 5½"
1' 11"
5' 9"
4' 1"
4' 0¼"
5"
3' 4"
5½"
4' 5⅝"
6"
5 FT 4 3 2 1 0

No. 1093 *looked very fine in front elevation.*

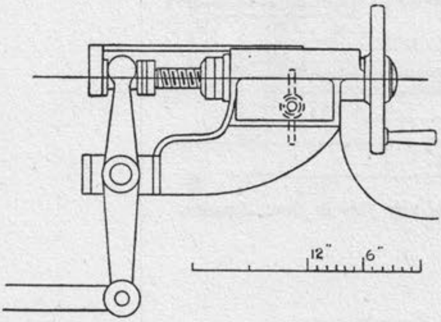

VALVE TRAVEL 4½"
LAP 1"
LEAD 3/16" BARE.
PORTS:
STEAM 1⅝" X 1' 1½"
EXHAUST 3½" X 1' 1½"
12" 1 FT 2 FT
4' 1"
3' 7½"
2 13/16
1' 2⅜"
1' 1⁵⁄₁₆"
1' 8⅝"
7¼"
1' 3¾"
2' 1"
4' 1"
1' 1"
1' 0¾"
2' 4"

Joy's valve-gear as fitted to L. & Y. Ry. No. 1093.

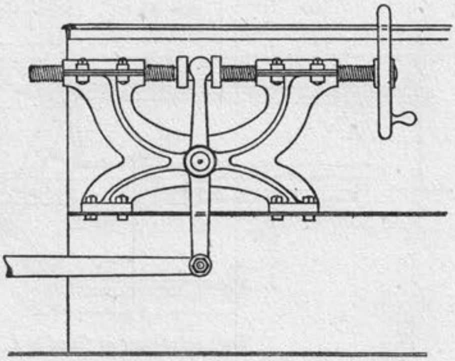
of numbers, these engines bore Nos. 1093-1112, 1220-1229, and an irregular ten built in 1894, viz., 318, 338, 339, 344, 368, 429, 430, 455, 488, 498.

The headlamps standard at that period on the L. & Y.R. had oval feet, which fitted into corresponding brackets attached in unusual positions, i.e. two, side by side, at the top of the smokebox, and one only over the right-hand buffer-beam. Be sure you fashion them correctly, locomodeller, if you build one of these "joy-to-beholds."

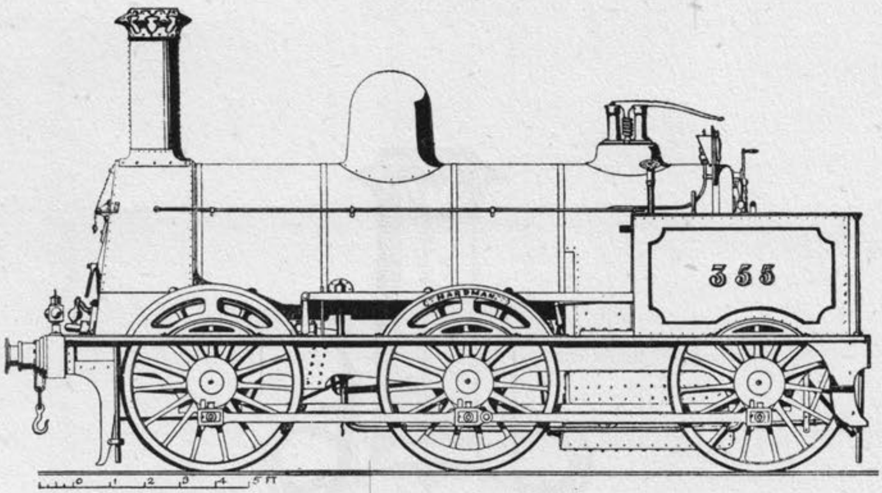
The tender, following the sound tradition of Crewe, who never believed in lugging along a cumbersome coalbox, was quite small. It weighed, empty, just under 15 tons, missing that tremendous total by exactly one-quarter! Nevertheless, it contrived to carry 3 tons of coal, but only 1,800 gallons of water. Still, what did that matter, seeing that it was fitted with a water-scoop?—and a water-scoop lowered and lifted by a vacuum cylinder and gear. Had Aspinall once upon a time personally struggled with the pull-rod of a L.N.W. water-scoop—and then vowed that his firemen, at least, should never have to indulge in such wrestling matches? The tender wheels had the odd diameter of 3 ft. $7\frac{5}{8}$ in. and were equally spaced over 10 ft. 6 in. The weight of the tender, full, came out at 26 tons 2 cwt. 2 qr., and I fancy even the gilt lettering on its sides



Screw reversing gear, L. & Y. Ry No. 1093.



Ramsbottom's screw reversing gear as fitted to D.X. class.



The first Ramsbottom D.X. goods engine, September, 1858.

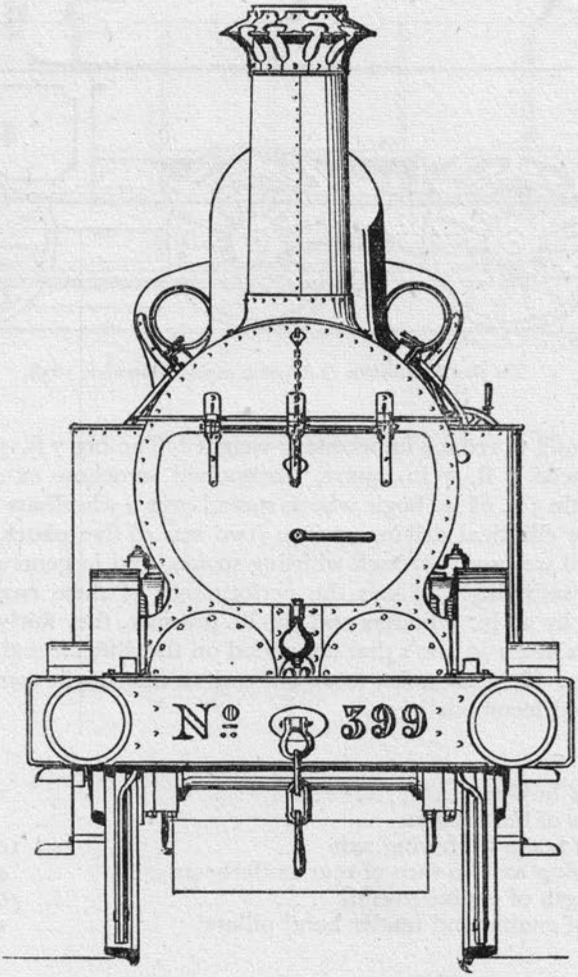
was kept small to reduce unnecessary weight! The big 7 ft. 3 in. driving wheels, spaced 8 ft. 7 in. apart, harmonised somehow extraordinarily with the little 3 ft. 0⅜ in. bogie wheels spread over a wheelbase of 5 ft. 6 in. The double elliptical driving springs (two sets of five plates, 2 ft. 6 in. long) looked well seen through whirling spokes, and in general all curves were most satisfying. So was the performance of these engines. With their 18 in. by 26 in. cylinders and 160 lb. pressure, they fairly dashed up the 1 in 84's and 1 in 100's that abounded on the difficult main lines they worked over. Here are a few more dimensions that might come in handy for you, good locomodeller :—

Locomotive

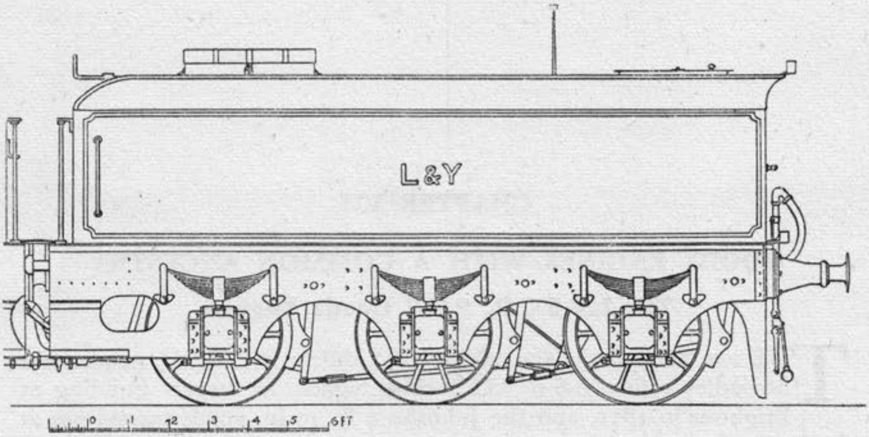
Length of buffers	1 ft.	9½ in.
Thickness of bufferbeam		1½ in.
Centre of bogie to driving axle	10 ft.	2½ in.
Back driving axle to face of rear bufferbeam	4 ft.	3 in.
Total length of engine overall	30 ft.	3¼ in.
Centres of engine and tender hand pillars	1 ft.	1½ in.

Tender

From bufferbeam to leading axle	4 ft.	0 in.
Wheelbase	10 ft.	6 in.
Trailing overhang	3 ft.	2 in.
Tank, length	16 ft.	4 in.
,, width	6 ft.	9 in.
Width over coping	7 ft.	8 in.



End view of D.X. goods engine.


L&Y
0
1
2
3
4
5
6FT

This tender followed on No. 1093 *to perfection.*

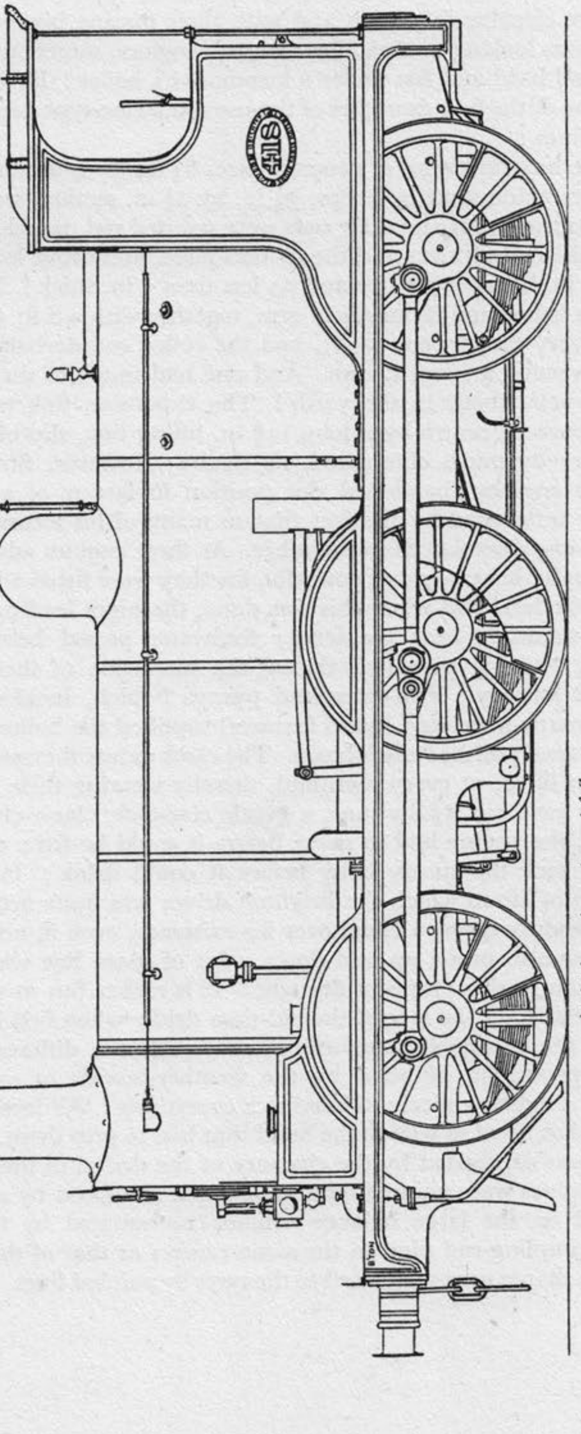
CHAPTER VII

GOODS ENGINES WITH A COMMON ANCESTRY

The L.B.S.C.R. " C " Goods Engines

THE two ancestors of the celebrated " Vulcan " L.B.S.C. goods were Stroudley's first 0-6-0 " C " class, which he began building at Brighton in 1871, and the Johnson 4 ft. 10 in. goods turned out at Derby in 1875. Let us consider the former engines for a moment.

When Stroudley and his assistant, Billinton, planned the " C " class goods, they envisaged a fine up-to-date example of a type of British goods engine which was already much in vogue. Before their eyes at this date were the splendid " DX " Ramsbottom engines working on the L.N.W.R., the Stirling G.N.R. six-coupleds, and the Gooch broad-gaugers, to mention but a few of them. Judged by these standards, the L.B.S.C. were big fellows, 17 in. by 26 in. cylinders, 5 ft. wheels, a boiler 4 ft. 6 in. by 10 ft. 4 in., heating surface 1,414 sq. ft., grate area 19.5 ft. and 140 lb. pressure. But they were light, notwithstanding their size, weighing 38½ tons with 14 tons 12 cwt. on the driving wheels, and they were often found in shunting yards, for they possessed a short wheelbase, only 7 ft. 9 in. plus 7 ft. 6 in., total 15 ft. 3 in. So far so good. Turning to details, they were solidly built with thick 1⅛ in. frames, placed 4 ft. 1½ in. apart, and as deep as 1 ft. 7 in. Their big boilers were placed low, centre-line only 6 ft. 10½ in. above rail level, and this fact (and the same remark applies to Gooch's G.W. engines) gave the impression that they were smaller than they really were. Their boilers were most carefully built up and hand riveted, and, like all Brighton pots, lasted for years and years. They proved also to be excellent steamers. The novelties came mostly at the front end. The two-cylinder block with steam-chests below, was an ambitious bit of casting on a big scale, and as the piston-rod centres were only 25 in. apart, thick crank-webs measuring 10 in. by 4½ in. and good 7 in. by 8 in. driving journals could be indulged in. The eccentrics were interesting, for they consisted of four separate castings, each being either the top or bottom halves of the fore and back pulleys. They were locked in correct position by a gab or lug, which took up on the crank-web, and which drove them round. The beautiful connecting-

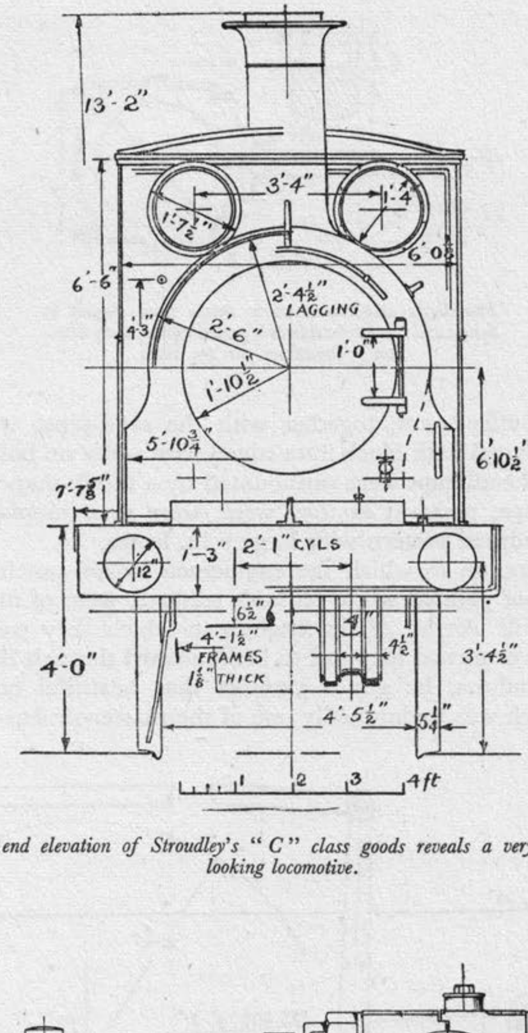


A very up-to-date engine for 1871! *A powerful and handsome one into the bargain!*

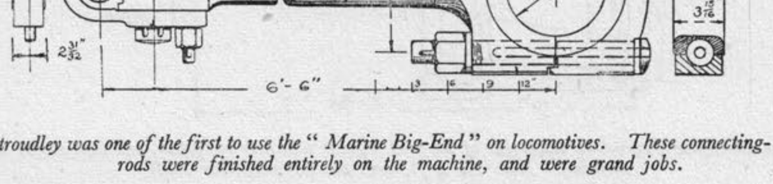
rods were circular in section and with their marine big-ends made one feel one was looking at a paddle-steamer's engines, somehow mysteriously ashore and hard and fast under a locomotive's boiler ! By the way, these were some of the first examples of the use of marine-type big-ends on railway engines.

The crank-pins were of generous size, 8¼ in. by 4 in., and the crank-arms were made stout by hoops, 3½ in. by 2½ in. section, well shrunk on. The eccentric straps and their rods were painted red, matching the inside faces of the main frames and the motion-plate, and drove large expansion links, 18 in. between centres and no less than 3 in. thick ! The weighbar shaft was below and its long 4 ft. arm, together with a 6 ft. 3 in. reversing lever (a very shapely one too !), and the coiled counterbalancing spring, made reversing a sweet dream. And one had much of that to do when biffing trucks about in the yards ! The expansion link was supported 2½ in. above its centre by a long 14¾ in. lifting link, slip of the dieblock being thereby much eliminated, no doubt. However, Stroudley in all his other engines abandoned this position in favour of a central one, probably influenced by the fact that so many of his locomotives ran as much in one direction as in the other. As these engines advanced in age they actually became more powerful, for they were fitted with 18¼ in. by 26 in. cylinders, and when this was done, the pipes leading some of the exhaust steam to heat the tender feedwater passed below the axles. Formerly one big pipe had skirted the underside of the boiler in its rearward journey. Two crosshead pumps (which, incidentally, incorporated many novel and sound features) supplied the boiler through two nicely-shaped polished clack boxes. The clack valves themselves revolved, as well as lifted, at every mouthful, thereby wearing their seatings true, and they gave out a jolly tune, a gentle clac-c-ck, clac-c-ck !

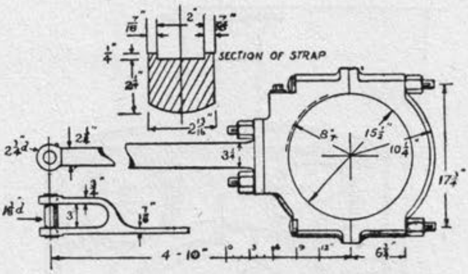
True, the engine had to move before it could be fed ; one had, as it were, to rock the sturdy baby before it could drink ; but this was a condition of life to which the Brighton driver was quite accustomed and did not unduly throw a cloud over his existence, even if, now and again, he did have to prowl up and down a bit of spare line when his gauge glass began to show signs of drought ! It is rather fun to try to picture the expression on the face of the old-time driver when first he clambered up into the extremely comfortable cab. What a difference from the meagre protection afforded by the weather-boards of earlier Craven engines ! And how nicely to hand was everything ! All levers were given handles that fitted so well to the hand that had to grip them. Everywhere the eye was captivated by the elegance of the design of the little details. These engines were painted dark olive-green enhanced by a broad black line, and on the large balance-weights (necessitated by the system of placing coupling-rod pins on the same centres as that of the crank-pins) the spoke shapes were continued to the tyres by painted lines. Guard-irons,


13'-2"
3'-4"
1'-4
1'-7½"
6'-0⅜
6'-6"
2'-4½"
LAGGING
4'3"
2'-6"
1'-0"
1'-10½"
5'-10¾"
6'10½"
7'-7⅝"
1'-3"
2'-1" CYLS
12"
6½"
4"
4'-1½"
FRAMES
1⅛" THICK
4½"
3'-4½"
4'-0"
4'-5½"
5¼"
1
2
3
4ft

An end elevation of Stroudley's " C " class goods reveals a very fine looking locomotive.


2⅞" dia
3"
1'1⅛"
3½"
8¼"
3 15/16"
2 31/32"
6'-6"
3
6
9
12"

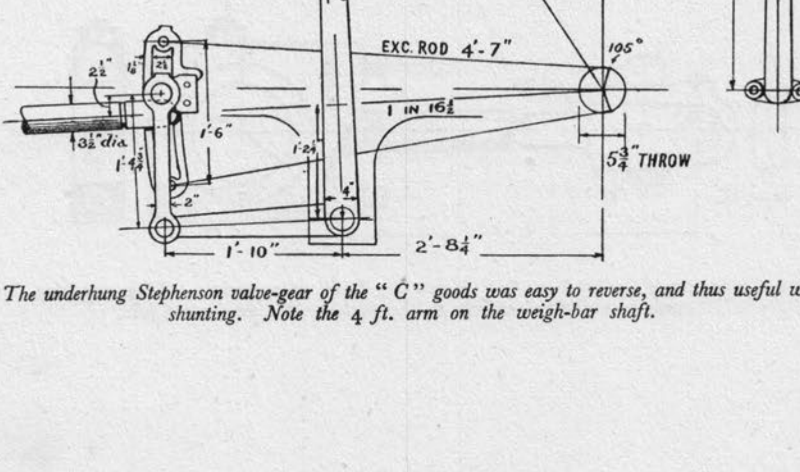
Stroudley was one of the first to use the " Marine Big-End " on locomotives. These connecting-rods were finished entirely on the machine, and were grand jobs.



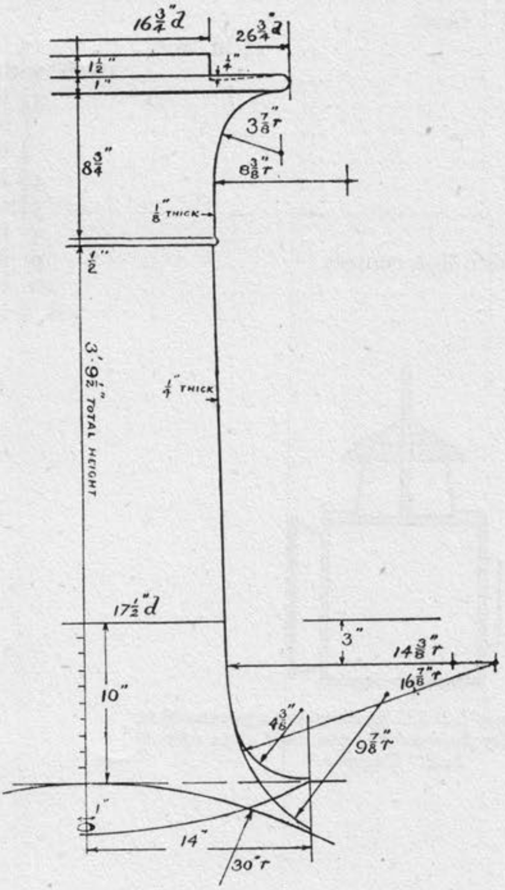
Stroudley's cast-iron eccentric straps were elegant in design and ran for considerable periods without any attention; sometimes for ten years.

buffers and buffer-beam, together with the sand-pipes were red, the beams ornamented with black lines edged with white on both their sides. Large square headlamps were surmounted by a nicely-shaped fluted top, but these lamps, pleasant as they were, were soon supplanted by the standard cylindrical pattern with large 6 in. lenses.

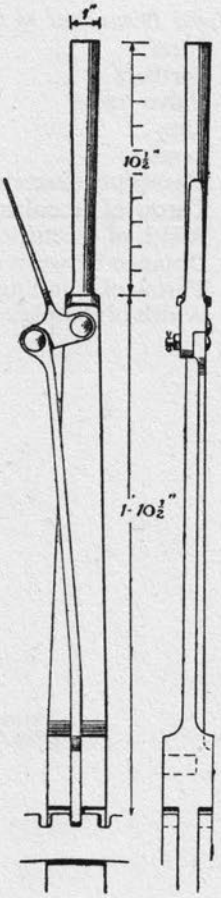
The tenders, on to which the enginemen looked out from under a curved cab roof painted white on both surfaces, were of much interest. They were well worthy of the engines to which they were attached. When the driver turned his head to look forward through the fine 16 in. plate-glass windows, he got a view of that beautiful copper-topped chimney, which was undoubtedly one of the master-strokes of Stroudley



The underhung Stephenson valve-gear of the "C" goods was easy to reverse, and thus useful when shunting. Note the 4 ft. arm on the weigh-bar shaft.


16¾" d
26¾" d
1½"
¼"
1"
3⅞" r
8⅜" r
8¾"
⅛" THICK
½"
3' 9½" TOTAL HEIGHT
¼" THICK
17½" d
3"
14⅜" r
16⅞" r
10"
4⅜"
9⅞" r
1"
14"
30" r

The standard Stroudley chimney as fitted to all his 17 × 26 in. cylinder locomotives. The only variation of course, was in total height. What a beautiful design it was!

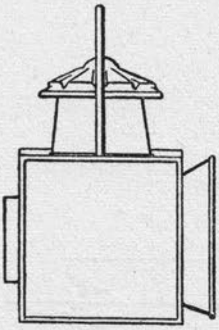


The catch on this shapely reversing lever was placed next to the driver, thus making for ease in manipulation. From top of handle to centre of fulcrum it measured 6 ft. 3 in. Some lever!

and which was, in some ways, their crowning glory. What did the engine crews think of their new machines? Well, if ease of working and splendid performance endear an engine to a driver, then, to put it mildly, they must have been well satisfied! They were not likely to forget Nos. 401-420 built between those momentous years 1871-1874, and many a pleasing memory must have come back to the men who worked these engines in their hey-day!

Useful Dimensions of the " C " Goods

Ports	1⅜ in. and 2 in. by 15 in.
Portbars	1⅛ in. width
Valve travel	3¾ in.
Lap	⅞ in.
Lead	⅛ in.
Blast pipe, diameter	4½ in.
Throw of eccentrics	5¾ in.
Width of eccentrics	3 in.
Distance between expansion link centres	9 in.
Throw of coupling-rods	10 in.
Width of footplate	7 ft. 2 in.



The early pattern of L.B.S.C. headlamp was a generous 8½ in. affair. Stroudley discarded this type about 1874 when he built " Grosvenor."

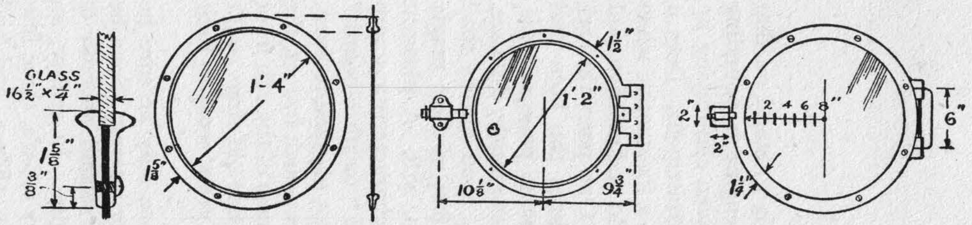
CHAPTER VIII

MIDLAND RAILWAY No. 1447

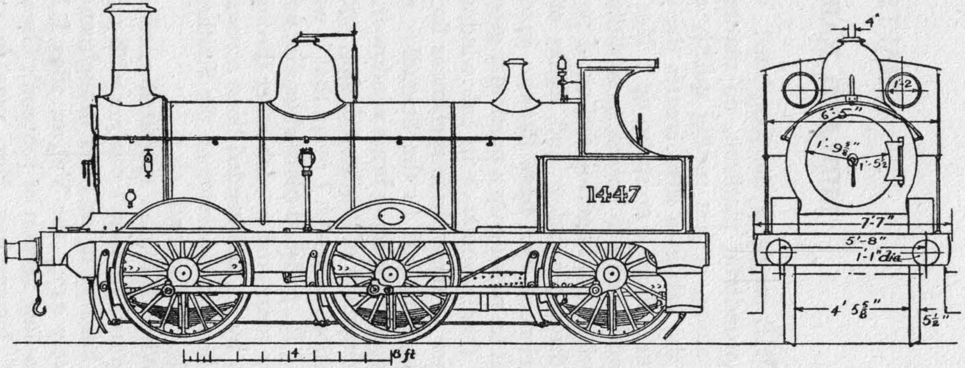
THE magic of the footplate! What a thrill it is to stand on that wonderful platform, no matter whether your engine is pounding along, or just resting quietly at a platform. Even clambering up into the cab in a shed creates the same feeling of excitement. Does it matter if there is no steam up? Not a whit! In fact, a locomotive when " dead " seems to possess an additional charm—so cold and massive, and yet with that lingering feeling of power and might. One peers through the driver's window and thinks of the countless times the keen and experienced eyes have likewise gazed through that same pane of glass, intent on picking up a particular green spot of light in the murky distance. Yes, there's romance in cab windows, right enough. And history too! Glance at these three specimens for example. The first of these magic circles belonged to the Stroudley goods engine, No. 418. A pleasant thing, this gleaming brass window-frame. It bore the characteristic stamp of refinement of Brighton design, and followed the old " weather-board " tradition, by which I mean that it was a fixture and not planned to open. The ¼ in. polished plate-glass disc was held between two such frames, the latter connected to each other through the ⅛ in. thickness of the cab front sheet by six ball-headed brass screws. Some of these fine old rings could still be seen in service on the Southern Railway ; 75 years' work to their credit. No so bad, eh?

When Billinton migrated northwards to Derby we may be sure he examined Johnson's engines with more than a passing interest. Soon he was hard at it, as chief draughtsman, planning the second ancestor of " lovely 447," the Vulcan 1893 L.B.S.C. goods engine. In reality, an up-to-date version of Johnson's Great Eastern Railway 0-6-0's, these fine M.R. locomotives, Nos. 1432 to 1471, were built in 1880-1, and had 5 ft. 2½ in. driving wheels, 17½ in. by 26 in. cylinders and an excellent boiler with a heating surface of 1,313 sq. ft. They were distributed between Burton, Birmingham and Manchester.

Did these newcomers differ very much from the Brighton " C " class the details of which Billinton knew so intimately? Not a lot really. To

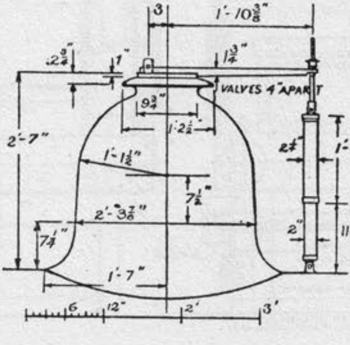

GLASS
16½"×¼"
1⅝"
⅜"
1'-4"
1⅝"
1'-2"
1½"
10⅛"
9¾"
2 4 6 8"
2"
2"
6"
1¼"

A study in windows! Stroudley on the left, Johnson in the middle and their descendant, young Billinton, on the right.

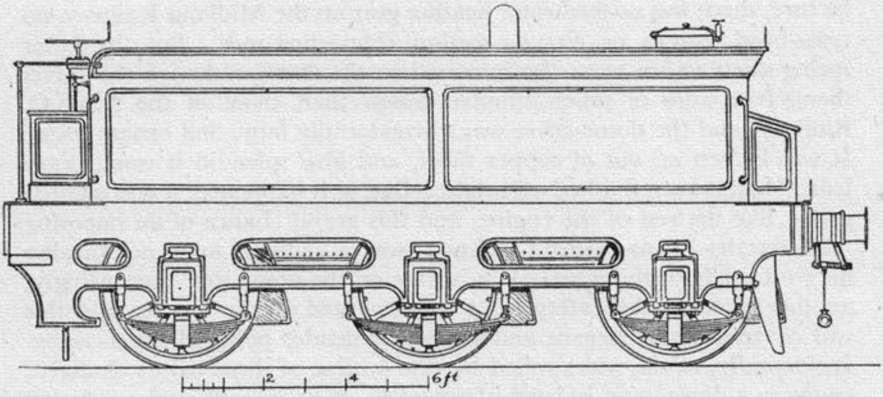

1447
4"
1'-2
6'-5"
1'-9⅜"
1'-5½
7'-7"
5'-8"
1'-1" dia
4' 5⅝"
5½"
4
8 ft

A fine example of a very numerous class of goods engine on the Midland Railway.

be sure, there was no feedwater heating gear on the Midland Railway, no cross-head pumps or circular-section connecting-rods. But the Salter spring safety-valves were also mounted on the dome, although the valves themselves were of much simpler design than those of the L.B.S.C. Railway, and the dome-cover was a wonderfully large and ornate thing. It was beaten up out of copper sheet, and how splendid it would have looked had it been finished off bright! But, as it happened, it was painted green, like the rest of the engine, and this grand chance of an imposing "eye-dazzler" was missed! Johnson was a cautious man, not putting his trust solely in those two 3½ in. valves on the dome top. Accordingly, another direct-loaded safety-valve was mounted on the firebox, and this was covered by an elegant and somewhat slender polished brass casing. Incidentally, as the years rolled by, the outline of these covers changed, owing to a diminution in height from 25 in. to 21 in., although not losing their grace. The Johnson cab was a very slight affair compared with the comfortable erection fitted to the Brighton engines, and consequently rather draughty. Its 14 in. windows were fitted with a catch and hinges, and so opened inwards, whether for additional ventilation or for easy cleaning being a moot point. Both facilities appeared a little unnecessary, yet when Billinton returned once more to Brighton to take charge there after the untimely death of Stroudley, he took with him the Midland Railway design in general, increasing however, the diameter of the glass to that of the Stroudley window, i.e. 16 in. The same could be said of some of the other details of Billinton's L.B.S.C. engines, particularly the chimney and the position of the sandboxes below the footplate. Now, although, perhaps, there was more "W.S." than "S.J." about Billinton's "Vulcan" goods, nevertheless the very prominence of the last two mentioned items gave the impression that they had inherited more of the good looks of the Derby family rather than those of her Brighton relatives!

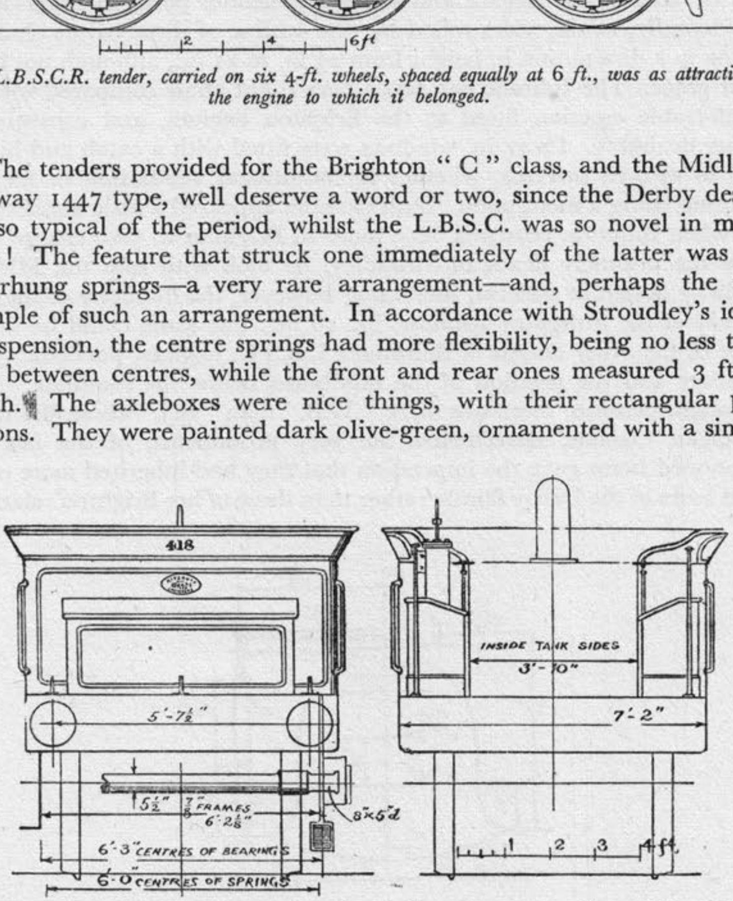


This dome was one of the most attractive features of the Midland engines.



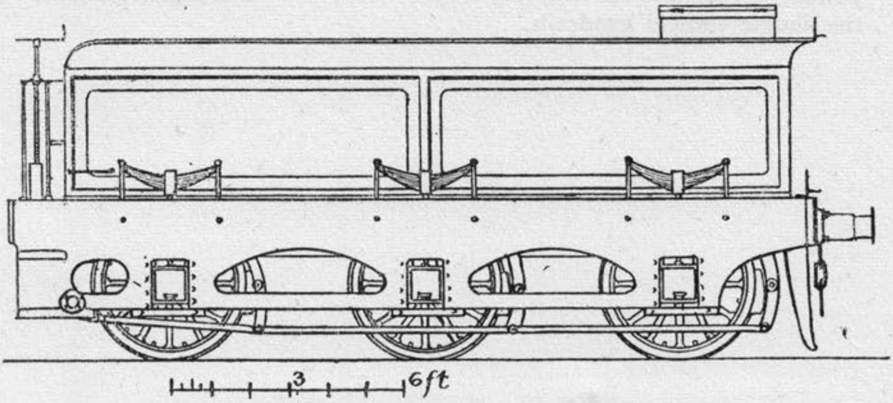
This L.B.S.C.R. tender, carried on six 4-ft. wheels, spaced equally at 6 ft., was as attractive as the engine to which it belonged.

The tenders provided for the Brighton " C " class, and the Midland Railway 1447 type, well deserve a word or two, since the Derby design was so typical of the period, whilst the L.B.S.C. was so novel in many ways ! The feature that struck one immediately of the latter was the underhung springs—a very rare arrangement—and, perhaps the first example of such an arrangement. In accordance with Stroudley's ideas of suspension, the centre springs had more flexibility, being no less than 4 ft. between centres, while the front and rear ones measured 3 ft. in length. The axleboxes were nice things, with their rectangular projections. They were painted dark olive-green, ornamented with a simple


418
5'-7½"
INSIDE TANK SIDES
3'-10"
7'-2"
5½"
⅞" FRAMES
6'-2⅝"
8"×5"d
6'-3" CENTRES OF BEARINGS
6'-0" CENTRES OF SPRINGS
1
2
3
4ft

The early Stroudley tender as seen on end. Note the large exhaust steam dome which was painted red-lead colour.

black line (a colour scheme applied to the whole tender) and were surmounted by oilboxes with polished brass lids. To keep the feedwater hot, the tender tank was lagged, the cleading plates extending the full width, 7 ft. 2 in., of the engine. Six rivets held the plating in place, with the centre rivets placed vertically over the middle axle. This gave an unequal length to the two panels of black banding. The toolbox was at the rear, and, as there was no side footplating, access to the tools could only be gained by clambering up the rather high single rear footstep. The spring hangers were adjustable, the rear one passing through an opening in the step. Originally, the water-filler was just a simple "slam-down" lid of sheet-iron, but later on a heavy dome-shaped cast-iron lid, complete with screw-down catch, was substituted. This, together with the big exhaust-steam dome and the top side of the tank, was painted that harmonious red-lead colour. This made a pleasing contrast to the prevailing olive-green scheme. At the cab end two wooden boxes were provided, the left-hand one for odds and ends, the other functioning as a sandbox. The standard pattern of hand-brake handle was fitted, as well as two brass handwheels, threaded through their bosses so as to actuate the feedwater cocks below the footplate. The tank held about 1,860 gallons of water, and was in the form (in plan) of a horse-shoe with straight sides. At this early period Stroudley had not hit on the idea of arranging the coal-well above the footplate level, and consequently the men often rigged up a couple of cross-boards to prevent the coals making a premature journey and gathering "friendly-like" around the fireman's ankles! But when, in 1875, a special tender was built for the



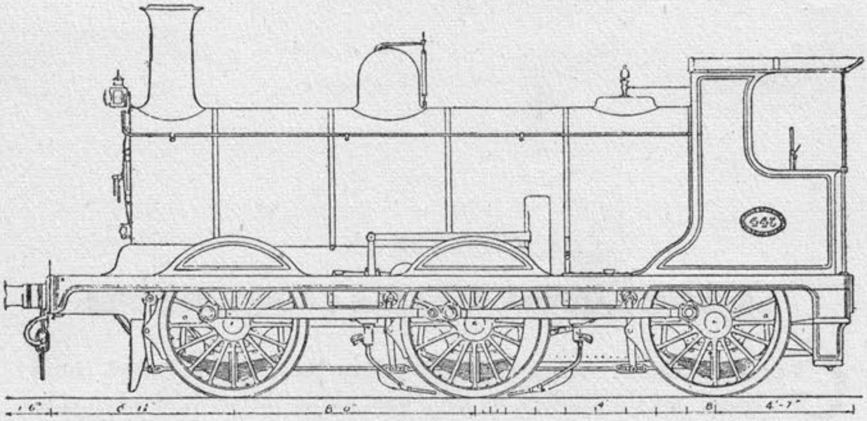
Early standard M.R. tender as coupled to No. 1447.

famous single-wheeler *Grosvenor* to go to the Newark brake trials, a front plate and lifting coal door were devised, although the tender itself otherwise was merely an enlarged version of the type under notice. Henceforth, this useful labour-saving device became standard on all L.B.S.C. tenders. Oh! and we must not forget the little gilt numerals on the coping at the back. The top edge of the coping, as well as the junction of it along the top edge of the cleading plate, were bordered with a black line. Buffer-beam and sockets were red, picked out with black lines edged with fine white ones. A lovely tender, I think, which was the perfect companion to a beautiful engine. The Midland tender, with its short 30 in. springs, placed above the footplate, was a typical specimen of the period, particularly the way the handbrake spindle was placed between the double vertical handrails.

CHAPTER IX

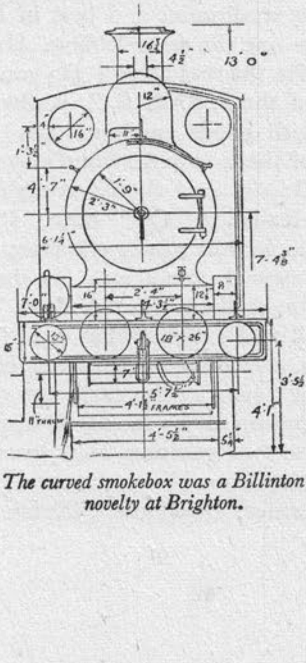
L.B. & S.C. RAILWAY " VULCAN " GOODS ENGINES

GOODS trains! What nice old things they are! Clang! clang! clang! go the buffers, as they pass along the news to each other that their engine is preparing to stop at the home signal. One gets a lot of fun watching the trucks as they come to a standstill. They are all so very individual, despite the fact that they have been built to pretty well standard design. Some sing little high-pitched melodies as they slowly move along, one chap murmurs a bass note which he produces from a variety of loose metal fittings, another suddenly bashes his fellow, who in turn tries to pass it on, but only succeeds in just gently kissing the buffer-heads of his pal. An amusing crowd. One never tires of their idiosyncrasies. One likes to remember, too, that these honest nameless and obscure workers form such a strong link with the past, for the wagons of ninety years ago were much like those of today. This provides a sense of continuity which is satisfying to a degree, especially to those who have loved all that was traditional and best in English railway history. Model goods trains give one the same feeling. How they clatter through the little station—just like the real thing! Do you remember the pleasant round-ended wagons of the L.B. & S.C. Railway? One can still see some about. And British goods engines! Oh! what a splendid lot! Make a quick survey of them in your mind's eye—right away from the old broad-gaugers of Gooch, and the Sturrock's and Ramsbottom's to the modern Southern Railway " Q1 " class. I'm sure you will agree with me that for good looks and sturdy efficiency they are well on a par with our express passenger locomotives. So many splendid examples suggest themselves, amongst them the " Vulcan " L.B.S.C. engines, the descendants of Nos. 418 and 1447. What exactly do I mean by that? To answer this question, consider a little the life-history of their designer. Robert J. Billinton went down, at the early age of 25, to take charge of the drawing office at Brighton under the newly-appointed superintendent, William Stroudley. The two geniuses both learnt much on arrival at the south coast. Stroudley from his predecessor (who left behind him a confused welter of mechanical ideas) and Billinton from his chief. During


447
6"
5' 11"
8' 0"
4' 7"

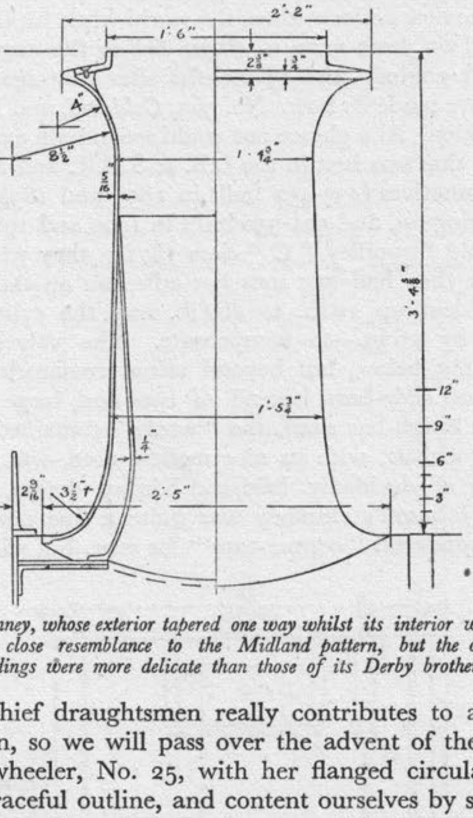
Lovely 447 *bore a strong likeness to the " C " goods of* 1871, *and to the splendid Johnson* 0-6-0 *goods engines as well.*

the momentous first four years many fine locomotives were designed at Brighton, including the 0-6-0 " C " class goods, the two handsome express engines *Belgravia* and *Goodwood*, the " D " tanks, and the celebrated " Terriers." The first mentioned, i.e. the " C " class goods, practically represented, at one bound, all that was best—and standard—in Stroudley's practice. One has only to mention the valve-gear, with its cast-iron eccentric straps, the sheaves cast in pairs, the cylinders (with valves underneath) cast in one, the novel marine big-end connecting-rods, the familiar coupling-rods, copper-cap chimney, regulator-valve, whistle,


1'6¾"
4½"
13' 0"
12"
16"
1' 3½"
4' 7"
1' 9"
2' 3"
6' 1¼"
7' 4⅜"
16"
2' 4"
4' 3½"
12½"
8"
7' 0"
18" × 26"
6"
7"
5' 7½"
4' 1½ FRAMES
3' 5½"
4' 1"
11" THROW
4' 5½"
5¼"

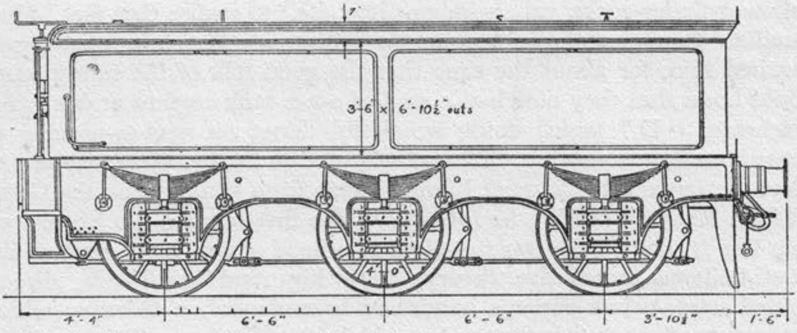
The curved smokebox was a Billinton novelty at Brighton.

tallow cylinder-cocks, cab, number-plate, etc., to realise that fact. How familiar they must have become to Billinton! But new experiences awaited him, for about the time that the good folk of the sunny south could boast that they now had a stud of 0-4-2 tank engines at work (the celebrated "D" tanks) doing wonderful things on next-to-nothing as regards coal consumption, Billinton migrated to Derby. There he was to meet the remarkable Samuel Johnson, fresh from triumphs on the Great Eastern Railway (hadn't he introduced the first bogie 4-4-0 express on that line?), and J.R.B. was subjected to a flood of new ideas, such as the small-boilered locomotive theory, strap big- and small-ends, direct-loaded safety-valves under a handsome brass funnel, a chimney which tapered smaller towards the top but which in reality tapered the opposite way inside! It is always dangerous to discuss how much a C.M.E. and



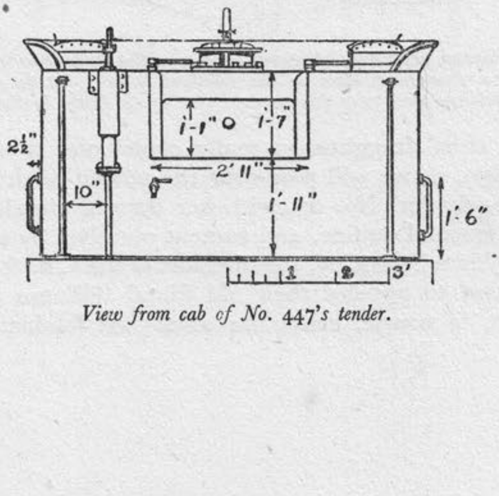
The Billinton chimney, whose exterior tapered one way whilst its interior widened t'other way. It bore a close resemblance to the Midland pattern, but the outlines of the mouldings were more delicate than those of its Derby brother.

how much his chief draughtsmen really contributes to any particular locomotive design, so we will pass over the advent of the first glorious Midland single-wheeler, No. 25, with her flanged circular front tube-plate, and her graceful outline, and content ourselves by stating that on the death of William Stroudley, the directors of the L.B. & S.C. Railway were well pleased to appoint their old friend Billinton to the vacant position. Then, of course, came the usual but fascinating question.

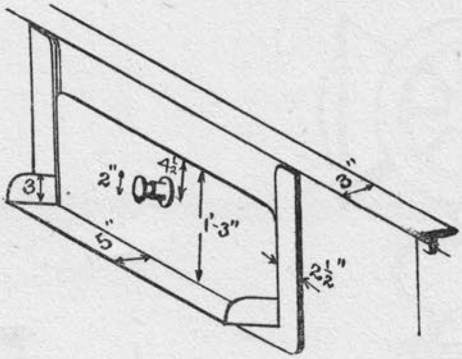


Tender of No. 447. *Billinton subsequently altered the shape of the trailing end and added coal rails. Many details were pure Stroudley.*

What would the new designer show the world when his turn came to plan his engines? Two years were to elapse before the answer came in the shape of a tank engine, and 13 months after that again before a 5 ft. goods locomotive made its bow. No. 363, *Goldsmid*, and No. 433 were the engines in question. At a glance one could see in both examples a delightful blend of all that was best in the L.B. & S.C.R. and Midland puffers! The goods locomotives (433-452 built in 1893 and 1894, by the Vulcan Foundry, Warrington, and 521-550 built in 1900 and 1902) were remarkably like the old Stroudley "C" class 1871; they weighed about the same, although they had two tons less adhesion on the driving wheels. The pressure went up 20 lb. to 160 lb. and the cylinders were ½ in. larger—18 in. by 26 in.—to compensate. The valves were between the cylinders, not below, but beyond using crossheads cottered to the piston-rods, four slide-bars instead of two and large 12 in. balance-weights on the weigh-bar shaft, the "works" remained much as usual. The Stroudley whistle, with its nice mellow note, was mounted on top of a manhole of decidedly Midland-Kirtley design, and Billinton's adaptation of Johnson's chimney was quite a fine one. Of course, it banished the wonderful "copper-tops" for ever, but still it was a lovely



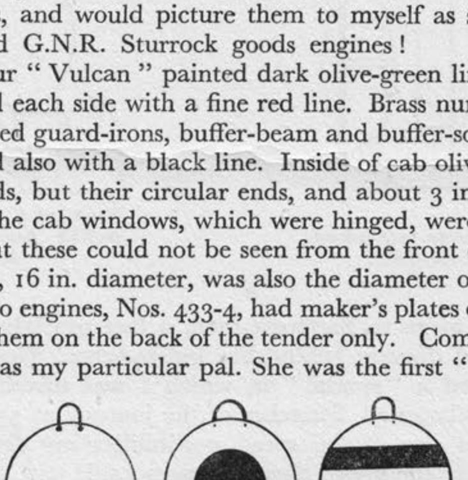
View from cab of No. 447*'s tender.*



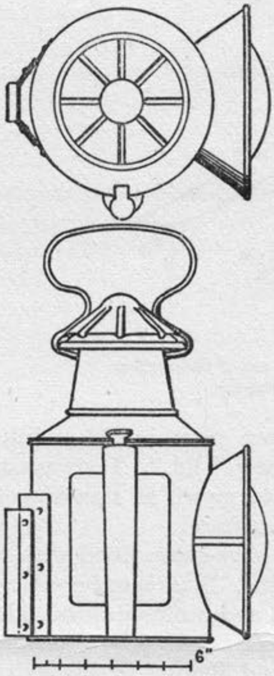
The coal door on Billinton's tenders was one of the excellent features borrowed from Stroudley.

thing in itself. Sometimes the cast-iron top plate would disintegrate and then the engines would run minus their " lid." I always rather liked them thus, and would picture them to myself as smacking somewhat of the old G.N.R. Sturrock goods engines!

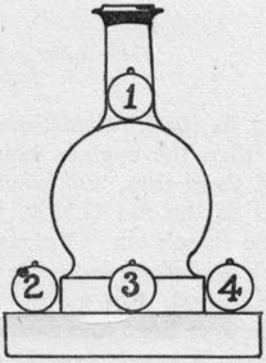
So there's our " Vulcan " painted dark olive-green lined with a thin black line edged each side with a fine red line. Brass number-plate with blue ground. Red guard-irons, buffer-beam and buffer-sockets. The two latter were lined also with a black line. Inside of cab olive-green, as also the coupling-rods, but their circular ends, and about 3 in. inwards, were left polished. The cab windows, which were hinged, were given polished brass frames, but these could not be seen from the front end, as the hole in the cab-sheet, 16 in. diameter, was also the diameter of the glass itself. Only the first two engines, Nos. 433-4, had maker's plates on the splashers, the others had them on the back of the tender only. Coming to personalities, No. 447 was my particular pal. She was the first " Vulcan " (with



The six headboards in use on the L.B.S.C.R. They were 15 in. in diameter. F represents a white disc with a green spot.



L.B.S.C. headlamps were painted black with red lining.



Front end of No. 447 showing possible positions for headboards.

her sister 446) to go to Battersea shed, a fact proclaimed by the little white B painted directly behind her buffer-beam. How excited I was when she hauled a "special" in which I was travelling for summer holidays to Eastbourne! Stretches of the journey at 55 miles per hour quite convinced one of the speed possibilities my dark green friend possessed! There she stood, after this memorable trip, at the end of the familiar arrival platform, looking very spick and span, her gleaming steel rods contrasting so well with the red cranks and eccentric straps (one got a splendid view of the motion under the high-pitched boiler, and quite unobscured by the small driving wheel splashers). The front buffer-beam was decked out with a nice array of headboards, a plain white, a white with two black diamonds in the centre, and a white with black cross over the left-hand buffer! A great morning, that!

What a lot of fun I had in the old days with a little model on which I was wont to set out the numerous headboards in their respective positions. The Brighton line had a wonderful code, rejoicing in a complexity of combinations. Most engines, including the "Vulcans," were provided with five or six headboards, 15 in. in diameter, and painted with a suitable symbol. Referring to my sketch of them, the plain white (designated A) had on its reverse side either a 2½ in. black cross D, or an 8 in. black spot B, or a "special" train double black diamond E or, later on, in 1900, when the new main line was built "through the Quarry" and avoiding Redhill, the double-black barred disc C. The Tunbridge Wells road in general was denoted by a green spot F, and this and the black spot B were either 8 or 10 in. in diameter, according to which shed painted up these pretty things. All special trains carried E and all Quarry line trains C, and since you might like to play my old game too, on your little model "Vulcan," here is a brief list of some of those more usually seen. Letters refer to the boards, the numbers designate the position on the front of the engine.

London Bridge and Brighton : No board, or E at 1.
London Bridge and Brighton (Thro' Line) : C at 1, or E at 1, and C at 3.
London Bridge and Portsmouth : A at 2, or A at 2 and E at 1.
London Bridge and Portsmouth : B at 1 and 2, C at 4 (via Three Bridges).
London Bridge and Hastings or Eastbourne : A at 2 and 4, C at 1.
London Bridge and Victoria : D at 2, also D at 2 and E at 1.
London Bridge and East Grinstead : F at 2 and 4, or F at 2 and 4 and E at 1.

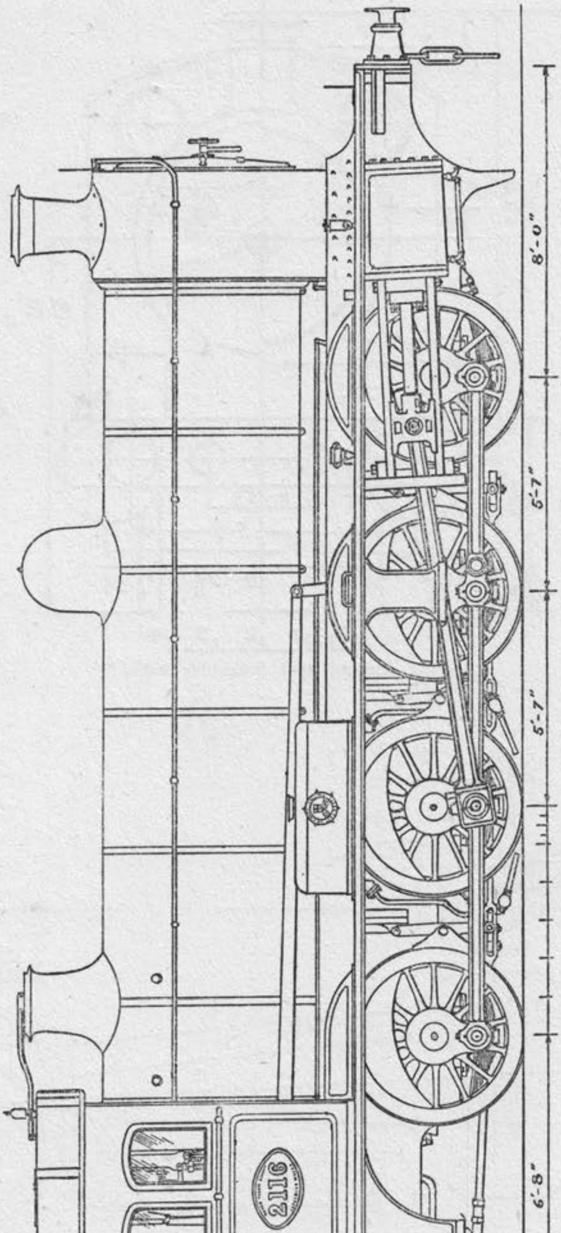
Now for a few from Victoria or Battersea Yard :—
Victoria and Brighton : D at 1, or D at 1 and E at 3 ; or D at 1 and C at 4.
Victoria and Portsmouth : D at 1 and 4, or D at 1 and 4 and E at 2.
Victoria and Hastings or Eastbourne : A at 2, C at 3, D at 4, or A at 2, D at 4, E at 3 and C at 1.
Victoria and East Grinstead : F at 4, or F at 4 and E at 1.
Victoria and Tunbridge Wells : F at 2, or F at 2 and E at 1.
Kensington and Brighton : B at 2 and 4 and C at 1.

Naturally these are only a selection ; but they are some of the very familiar ones. What made the code so exciting was that the lamps at night bore little or no correspondence with the day headboard code! The Stroudley lamps, with their big 6 in. lenses, were also taken over, lock, stock and barrel, by Billinton. They were painted black, and lined out with two rectangles of red lines for the goods engines (yellow for the passenger locomotives), and had the number of the engine in red (or yellow) on their left-hand side. These numerals were of the same charming design as those appearing on the number-plates. Yes, there were great family ties between 418, 1447 and 447.

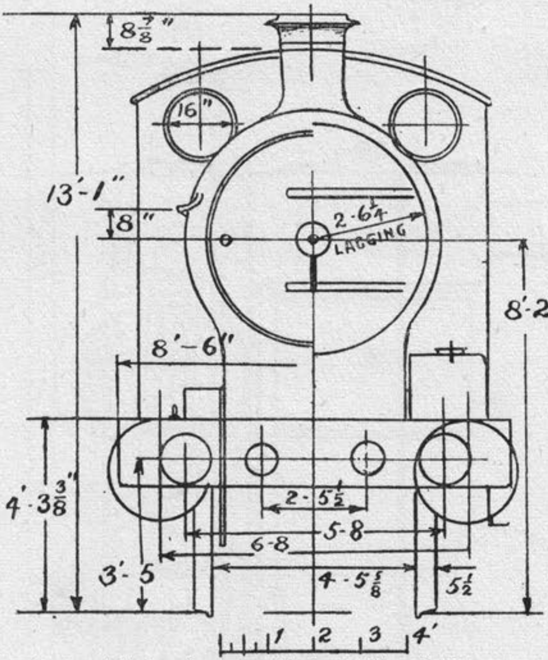
CHAPTER X

A SPLENDID GATESHEAD GIANT

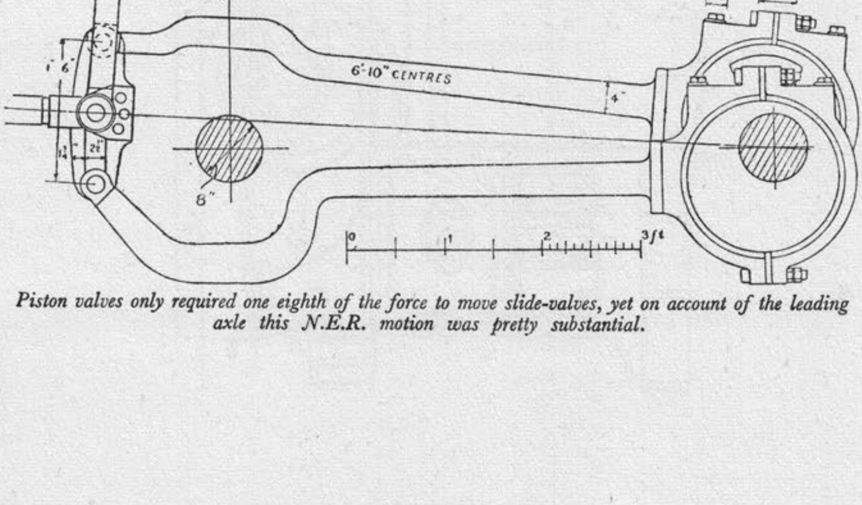
AS a contrast to the medium-powered goods engines already described, what about a glance at a regular whopper? You know the kind of chap that walks off with a mere 1,300 tons without a murmur! There is a fascination in the very small locomotive, of course, but there is also glamour surrounding the giant. In this connection, how well we remember the growth of the coupling-rod in our earlier days! From the modest 7 ft. 7 in. of Stroudley's *Gladstone* to the 9 ft. rod of Johnson (which he first introduced on his 4-4-0 M.R. No. 2183 in 1892) we felt to be a tremendous step. And when Dugald Drummond had the temerity to give us a ten-footer on his splendid L.S.W. No. 702, we almost expected to see this monster buckle up into all sorts of fantastic curves as soon as the wheels went round! But nothing so spectacular happened, and we soon got used to the sight of those shapely polished rods gently revolving as one of the nicest-looking of locomotives sped on its way to sunny Bournemouth. I remember reading once in an engineering treatise that the ideal connecting-rod was of infinite length. I thought immediately of Webb's *Hardwicke* with a 71 in. rod urging round a 12 in. crank! Yet *Hardwicke* was a flyer, if ever there was one, and some fine and fast angular antics must have been going on during her record run from Crewe to Carlisle on that memorable August 22nd, 1895. Or again, think of Stroudley's *Gladstone*. A 78 in. connecting-rod associated with a 13 in. crank, a ratio of 1 to 6, and almost the same as *Hardwicke's*. Soon after this startling gap between theory and practice, another wonder crossed my path—this time one of those lovely official photographs of a Worsdell N.E.R. engine. Now a volume, at least, could be written about official photographs, and a jolly interesting book, I believe, it would prove to be. But surely, oh! surely, there never was a more attractive series to delight the eye of the locomotive enthusiast than those pictures of N.E.R. engines. Of course, there were two good reasons for this. Firstly, the puffers themselves were particularly handsome, and, secondly, the gent who took them was a peculiarly gifted artist—one of those clever chaps with just the right touch. He made each new type look more attractive than its


8'-0"
5'-7"
5'-7"
6'-8"
2116

Shift 1,300 *tons? Of course I can—easily!*

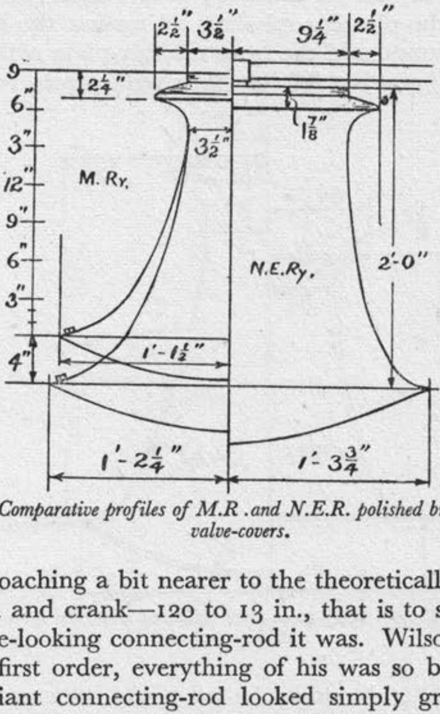

8⅞"
16"
13'-1"
8"
2-6¼
LAGGING
8'-2"
8'-6"
4'-3⅜"
2-5½
5-8
6-8
3'-5
4-5⅝
5½
1
2
3
4'

Moving forward with irresistible might!


1' 1½"
10"×10"×4½"
½"
2½"
4½"
6'-10" CENTRES
4"
1' 6"
1¼"
2¼"
8"
0
1
2
3 ft

Piston valves only required one eighth of the force to move slide-valves, yet on account of the leading axle this N.E.R. motion was pretty substantial.

predecessor ! How marvellous the epoch-making 4-6-0 No. 2001 appeared to be ! No wonder they wanted to send one of her sisters to the Paris Exhibition of 1900—just to show what Gateshead really could do in the locomotive line. One hardly got over the excitement of all this when a most delightful thing happened ! The by now familiar N.E.R. outlines transformed themselves into a super 0-8-0 goods engine. Even today, as one examines the sectional drawings of this beauty, one thrills at the sight of her 4 in. diameter piston-rod, her colossal 15 ft. boiler, and (here comes the cream of the matter) her grand 10 ft. connecting-rod. Ah ! now at last we are approaching a bit nearer to the theoretically perfect relationship betwixt rod and crank—120 to 13 in., that is to say, almost as 1 is to 9. And a nice-looking connecting-rod it was. Wilson Worsdell was a designer of the first order, everything of his was so beautifully proportioned. That giant connecting-rod looked simply grand, as it slowly revolved with its irresistible might, an impressive effect heightened by the background of the accompanying three lengths of coupling-rods. The fascination of speed appeals undoubtedly to all railway lovers. But what about the attraction of a locomotive moving along very slowly ? Who has not, at some time or another, actually walked at the side of an engine which was barely moving down a shunting road ? Or, maybe, along a departure platform as the " ten-o'clock," receiving the final " right-away " from the guard, made its first thrilling movement forward towards its far-distant destination ? Just the same with our miniature. That is why I am sure No. 2116 would make a grand model. One could watch

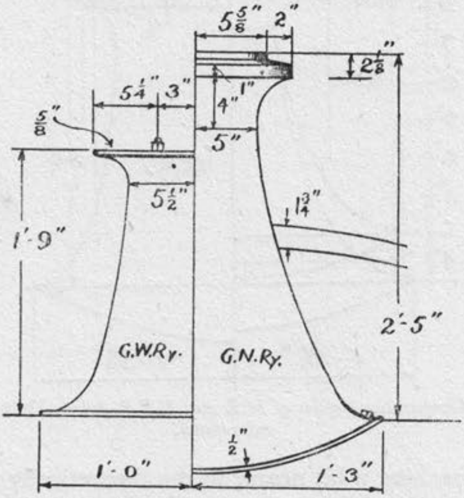


Comparative profiles of M.R. and N.E.R. polished brass valve-covers.

that tremendous 10 ft. connecting-rod slowly turning round and round at one's leisure. And just picture the effect of the giant boiler!

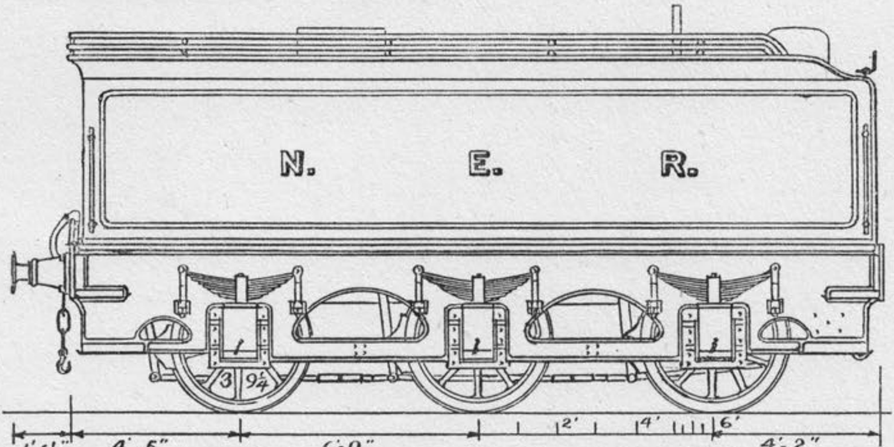
One could see the whole of its lovely cylindrical form from end to end, so high-pitched was it. The eye was led on towards the cab, a real North Eastern with curiously low side windows and deeply-curved roof. The boiler mountings, too, were first-class.

Imagine the tall polished brass valve-cover, as seen in perspective against the nice brass-rimmed circular windows, the jolly dome, and that charming chimney with its gleaming brass cap placed high up on a smokebox noteworthy for its satisfying proportions. Study the position of the handrails, the pleasing splashers set against the long level of the top of the main frames, and the brass number-plate with its black background. All these items just fell into their right places, each contributing almost unconsciously, one might be led to say, to a most lovely engine. Clean, sweet and strong, stood No. 2116, on her eight grand wheels.



Dean's safety-valve cover compared with the later Stirling pattern.

Here again was the same sense of fitness of design, the big crescent balance-weights revolving round finely-shaped hubs, the deep-section coupling-rods and magnificent 10 ft. fluted connecting-rod keeping gravely in time with all the harmonious revolving masses. Surely never a finer-looking engine, so characteristic of all that was best in English locomotive design at that period, was ever built up North! One, I suppose, is tempted to dwell on exterior appearances. Especially is this true of the model-maker, the amateur who is really not so concerned with performances as is the professional engineer, whose job it is to get the modern heavy loads shifted along the line from place to place. It is doubly pleasing, therefore, to recollect what wonderful feats these engines performed, and be it remembered, all this taking place before the introduction of superheating, forced lubrication, and the like. During a test between Stella Gill and Tyne Dock one of these monsters climbed a ¾ mile bank of 1 in 108, containing two sharp curves, with a load of 81 trucks and a van, the total weight of which was 1,326¼ tons! As we look at our model, the recollection of such meritorious performances does endear the little miniature more and more to us.



A tender lovely alike in photograph or model. Note the unusual location of the tool-boxes—across the tank.

Useful dimensions of No. 2116.

Cylinders	20 in. by 26 in.
Piston-valves	8¾ in.
Ports	1 ft. 7¾ in. by 1⅜ in.
Maximum travel of valves	4 21/32 in.
Lead	⅛ in.
Length of slide-block	1 ft. 5 in.
Diameter of wheels...	4 ft. 7¼ in.
Crank pin	5 in. dia. by 6⅜ in.
Frames	1 in. thick, 4 ft. apart
Boiler, diameter outside	4 ft. 9 in.
,, length	15 ft. 0 in.
Firebox, length	7 ft. 6 in.
,, weight (W.O.)	58 tons 6 cwt.
Tender frames	⅞ in.
,, distance between	6 ft. 2¾ in.
Tank	3,164 gallons
Coal	5 tons
Weight (W.O.)	38 tons 12 cwt.

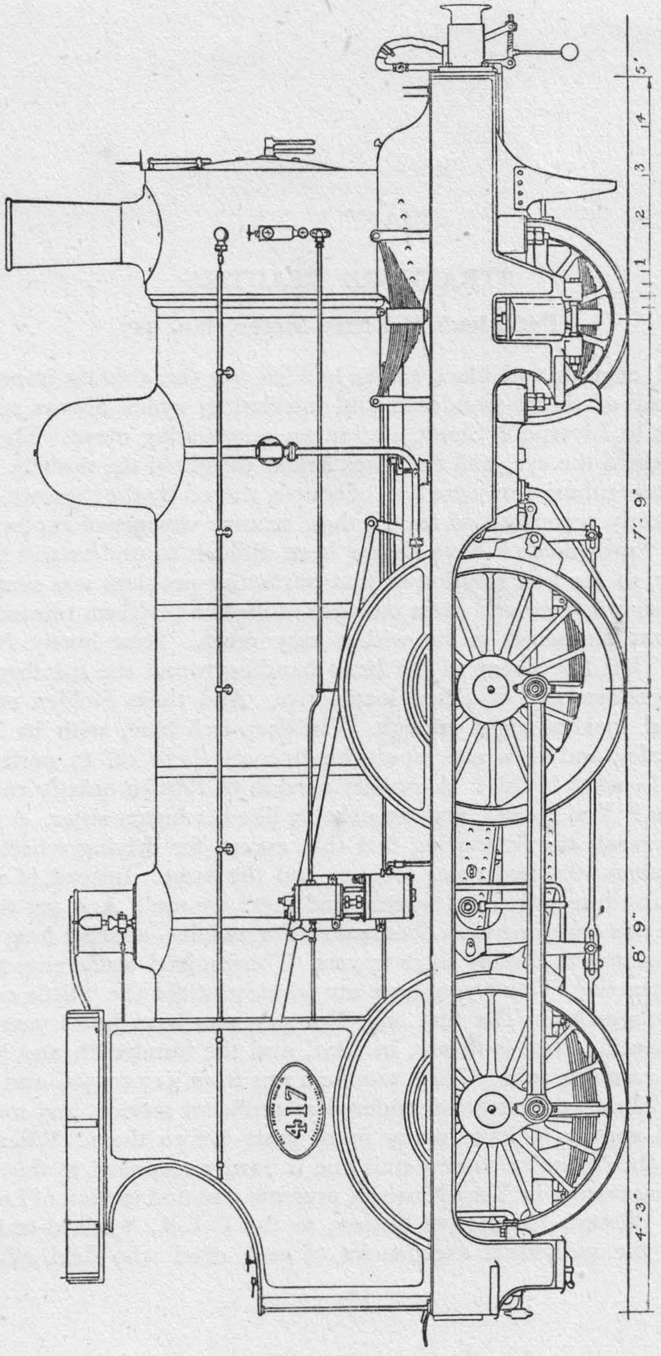
The N.E.R. engines were light green edged with black, a fine inner white line separating the two colours. Angle frames black, lined with a fine red line. Guard-irons also black. The buffer-beam and buffer-sockets were red, the former edged with a black and white line. Cab roof white, interior of cab grained, and the gilt tender letters were shaded with red. The boiler bands were black with a fine white line on either side—the whole scheme achieving a magnificent effect.

CHAPTER XI

STRATFORD BEAUTIES

"Petrolea's" Little Sister, No. 417

BLUE engines and black smoke! This was the abiding impression I had of things wonderful and interesting, which always made a visit to Liverpool Street station an outstanding event. The blue paint gratified the eye, and the black smoke delighted the nostrils. Such engineering enthusiasms were not, of course, shared by the "grown-ups" who patiently accompanied me on these strange voyages of exploration. But then "grown-ups" have always been difficult to understand by the small boy, so the best solution of that particular problem was simply to ignore their presence and press onwards along the platform towards any engine that happened to be within easy reach. How lovely *Petrolea* looked! That fine sweep of the brass banding round the splashers was a worthy adornment of a fine locomotive. And those Holden engines were good lookers, right enough. The deep rich blue, with its broad black border and thin red separating-line set them off to perfection. But hold!—what is this? A smaller version of *Petrolea* quietly running towards us? Yes, indeed, and remarkably like her bigger sister. A closer scrutiny reveals the interesting fact that except for driving wheels and their splashers, the two types are one and the same. Instead of seven-footers, substitute 5 ft. 8 in. wheels, and there we are! And yet what a difference this one dimension does make. For awhile—a rather long while —my allegiance to the big sister wavers. These mixed-traffic engines are *so* very attractive. Don't you share my admiration for the "little sister," good locomodeller? The first one, No. 417, was born just a year after *Petrolea* herself; that is to say, in 1891, and the hundredth and last of the class, came in 1902. Their numbers ran from 417 to 506 and 1250 to 1259. These engines have rendered magnificent service, and some of them still appear to have many more years before them. When one considers the design in more detail one is hardly surprised at this. Just as *Columbine* resting in York Museum presents a potted version of London & North Western locomotive history, so the G.E.R. "mixed-traffics" epitomise the individual excellencies of each chief who held office at

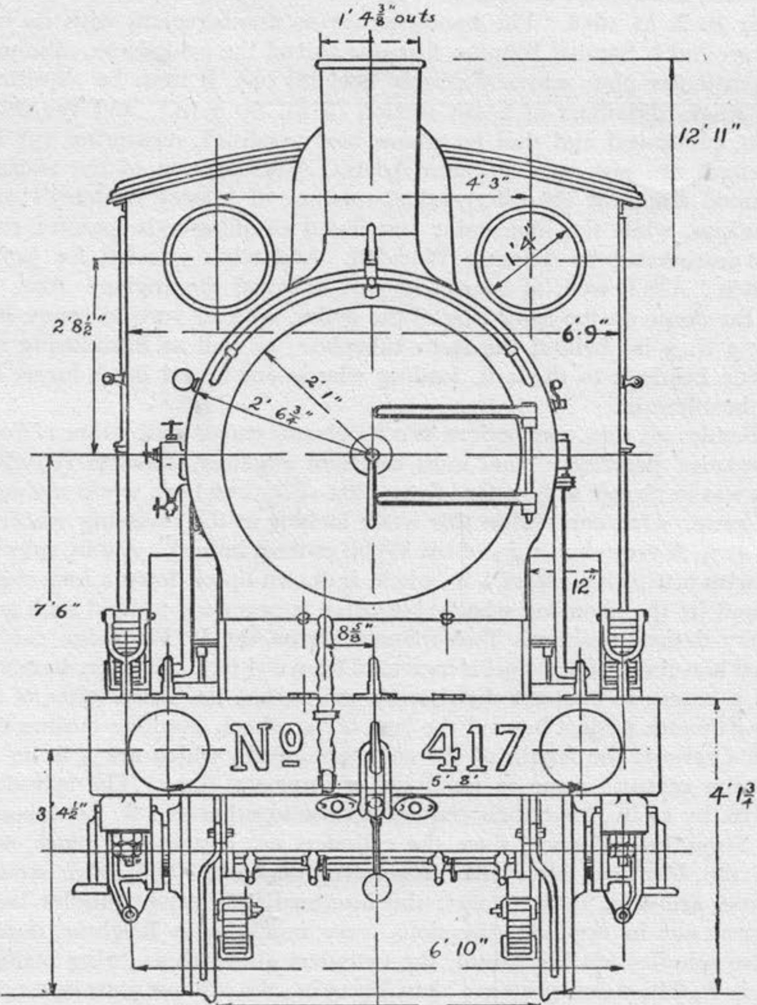


The G.E.R. mixed-traffic engines are most attractive. A model would bring out their good points far better than any drawing.

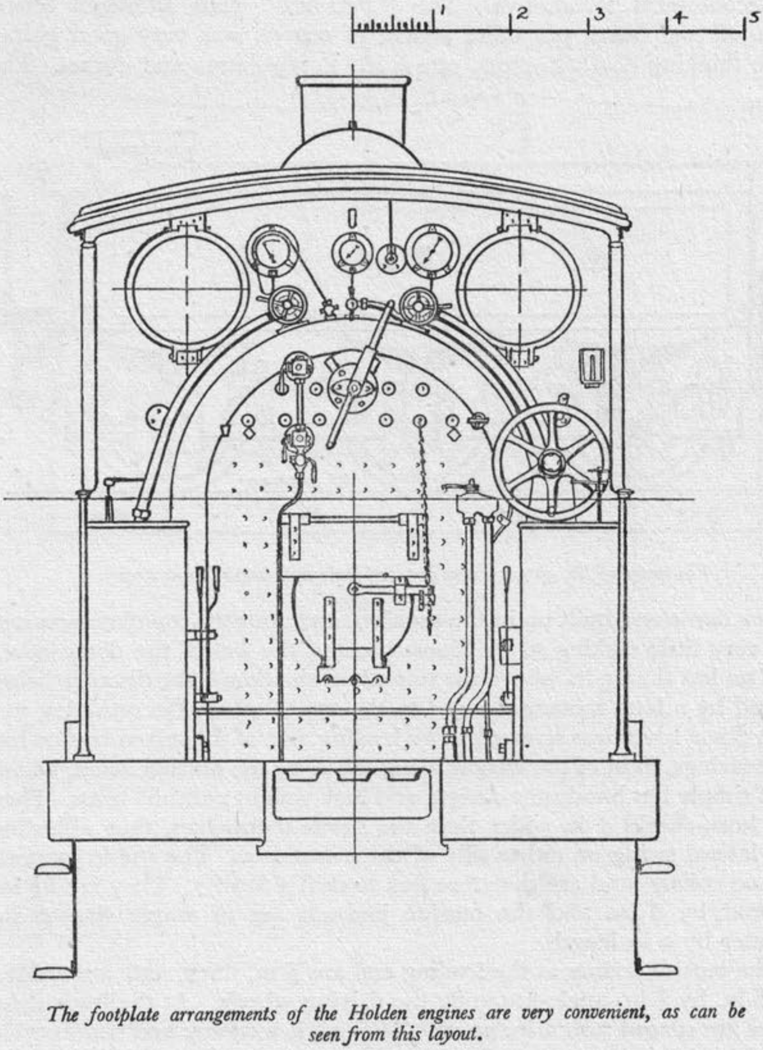
Stratford Works! No wonder such a bundle of perfections should prove a magnificent creation! Let's take a few items at random to show what is meant by this. The shapely stove-pipe chimney catches our eye. Well, of course, old Robert Sinclair brought *that* down from Scotland with him as far back as 1856. The handsome brass number-plate with its red background? Samuel Johnson first introduced the oval shape, although his particular plate was not exactly like this one, it must be admitted. The single slide-bars of heavy section (6 in. by 3 in.), and the thick $2\frac{7}{8}$ in. piston-rod and that enormous box crosshead, measuring $13\frac{3}{4}$ in. in length are just pure William Adams. The position of the whistle, mounted alongside the safety-valve, was one of Massey Bromley's contributions, while the blue paint and fluted coupling-rods (painted red) were introduced by Thomas Worsdell. And what was left for James Holden? Oh! well, of course, he just designed the engine! Also, he put the dome on the front ring of the boiler, with its vertical centre-line only 3 ft. 3 in. behind the front tubeplate, as well as introducing the outside bearings to the 4 ft. leading wheels—oh! and don't forget his red headlamps!

Besides all this, connections can be clearly traced with other railway companies' practices. That most excellent engineer, Thomas Worsdell, who was in charge at Stratford from 1882-1885, had been works manager at Crewe. One can realise this when looking at the reversing wheel of No. 417. A very close copy of the Webb pattern indeed. A 2 in. spindle, cut with a triple-thread of 1 in. pitch, is drawn up or down a long sleeve rotated by the reversing wheel. No catch is necessary to hold such gear in any desired position. Two refinements on the Webb design can be noted however. The wheel is increased from $13\frac{1}{2}$ in. to 18 in. in diameter, and a brass cap protects the driver's wrist when the sharp edges of the screw threads project beyond the boss of the wheel. Another curious link with Crewe is the length of the connecting-rods, which are 5 ft. 11 in. between centres—same as *Hardwicke* of immortal fame. The cylinders, $17\frac{1}{2}$ in. by 24 in., have their centres as close together as 2 ft. Here comes the Stroudley influence, since the cylinders are cast in one block, and, like the *Gladstone*, have the slide-valves beneath. The valve spindle centres are only 13 in. apart, the intermediated valve spindles being splayed out in opposite directions, very much as in Brighton design. These spindles are horizontal, the cylinders above them being inclined at 1 in 8. The steam-ports are $1\frac{1}{2}$ in. by 15 in., the exhaust ports being nice and free, $3\frac{1}{4}$ in. by 15 in. The slide-valve lap is $\frac{7}{8}$ in., mean lead $\frac{1}{4}$ in. and full travel $3\frac{3}{4}$ in. The eccentrics, $16\frac{1}{2}$ in. diameter, have a throw of $5\frac{3}{4}$ in.

Many of the Great Eastern drivers of the old school seemed to have believed in "treating 'em rough," for they had the curious habit of slamming over the regulator to "full" when starting, and then just waiting for things to happen. Things happened right enough!—for

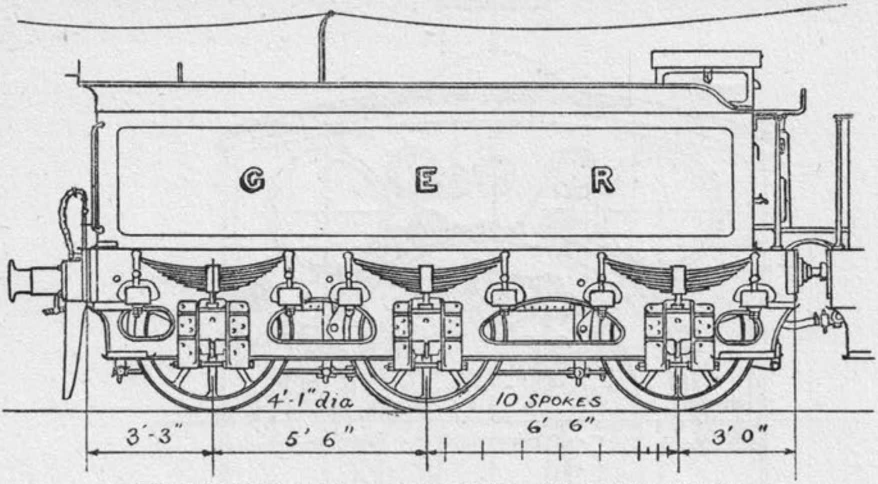

1' 4⅜" outs
12' 11"
4' 3"
1' 4"
2' 8½"
6' 9"
2' 1"
2' 6¾"
7' 6"
12"
8⅝"
No 417
5' 8"
4' 1¾"
3' 4½"
6' 10"
4' 5½"

An end view gives a good idea of the massive radial boxes and outside frames.



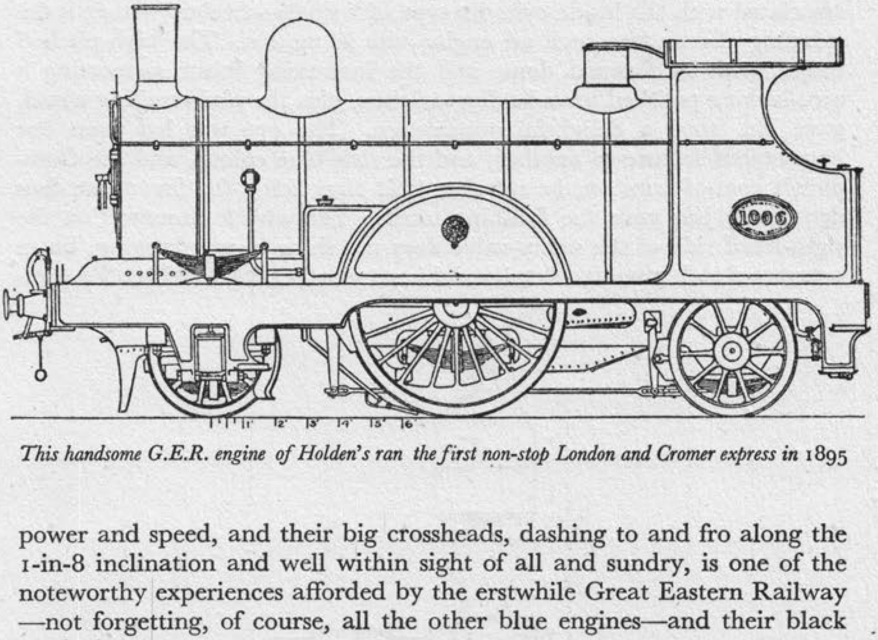
The footplate arrangements of the Holden engines are very convenient, as can be seen from this layout.

Holden's big boilers have a big 5½ in. diameter steam-pipe, and violent slipping and rushes of steam testified to the ample supply such a large pipe gives. It was one of the special features of both classes of engines, and it was claimed that this big steam-pipe created a very free-running and economical locomotive. The "Petrolea" class averaged about 28 lb. of coal burnt per mile, which, of course, was very good going. While thinking of steam-pipes, one is led to regulators and domes. The Holden dome was built up in the usual manner, but the top plate was cast with very little dishing to it. Consequently, the top of the dome cover stood no less than 5 in. above the summit of the dome, the distance being bridged by a long rectangular rod to the top of which the retaining nut of the dome cover was screwed. The leading axle of the mixed traffics has four bearings, most of the weight being taken by the outside boxes, which are of simple but handsome design, and look well in polished brass. They have horn-cheeks 1 in wider than the horns themselves, thus affording ½ in. lateral swing on either side of the centre-line. The inside journals have no collars, and are therefore free to shift sideways. They are 8¼ in. diameter by 8 in. and the outside journals are of ample size—6 in. diameter by 9 in length.



The tender of No. 417 *is a neat one, and looks well coupled to its engine.*

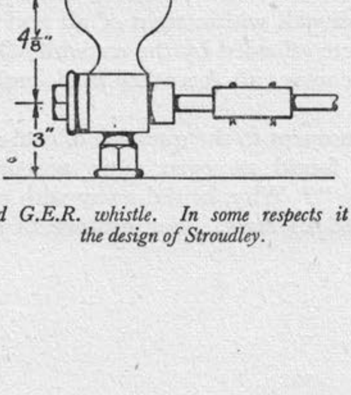
The outside frames at the leading end are ⅞ in. thick, and are welded to a 6 in. by ¾ in. angle-frame by the driving wheels. At the front these frames are spaced 7 ft. 2 in. apart. The cab is a roomy and comfortable one with wide side panels and a long sheltering wooden roof. In G.E.R. days it was painted light brown on the inside, while grey was the colour employed for the inside faces of the main frames and axles. The gilt letters on the tender sides were shaded with brown and red, whilst the yellow numerals on the red buffer-beam were shaded in brown. The cab fittings are characteristic of Holden's practice. The regulator handle is of circular section, bent over at each end to a right-angle, thus forming an easily-made handle. One water-gauge and one test-cock (the latter placed on the right-hand or driver's side) gives the indication of water level, and the Westinghouse brake-valve is conveniently placed nearby the reversing wheel. Steam for the injectors is controlled by two valves placed on top of the firebox. They have circular brass handles with one spoke projecting beyond the rim—a useful thing when a valve gets stiff. The whistle handle is a vertical lever, and to its upper end a cord is attached which runs immediately below the cab roof, so as to be within easy reach. Of course, in the old days, this cord was attached to the passenger communication cord, and the little " ship's davit " can be seen in the middle of the tender top which guided the said cord from engine to carriage. Running fast, these fine " mixed-traffics " look most attractive, their curiously hunched-up proportions giving the impression of both power and speed, and their big crossheads, dashing to and fro along the 1-in-8 inclination and well within sight of all and sundry, is one of the noteworthy experiences afforded by the erstwhile Great Eastern Railway —not forgetting, of course, all the other blue engines—and their black smoke!



This handsome G.E.R. engine of Holden's ran the first non-stop London and Cromer express in 1895

Returning for a moment to the question of coal-shifting, do you recall how James Holden found an even more acceptable solution to the " fireman's back-ache "? Why, he did away with coal altogether! I bet many a fireman blessed his name. For instance, of his 21 fine 7 ft. singles, 6 were fitted to burn oil fuel. When they ran the fast Cromer expresses, covering the 130 miles between London and North Walsham in 160 minutes non-stop, all the fireman had to do was to regulate the burners to maintain the needle at a constant 160 lb. pressure—rather different from shovelling a ton of coal through a small firehole door in 80 minutes!

No. 1006 was one of those engaged in this service and previous to this was the first engine to make a non-stop run between London and Cromer with a special train on November 3rd, 1895. Their designer was prompted to favour a single-wheel type, after experimenting with one of the "Petrolea" class running with her coupling rods removed. Another potent factor was the improvement in the manufacture of steel rails, which enabled Holden to place as much as 16 tons 2 cwt. 2 qrs. on the driving wheels! In this he followed the example of Stirling, who had always given great adhesive weight to his single-wheeled locomotives. Of these engines, No. 780 was built in 1888, followed by Nos. 770-779 in 1891 and Nos. 1000 to 1009 in 1893. In appearance they had the charm that was always associated with the inside cylinder type of "single-wheeler"—that is the spinning effect when such an engine was in motion. The high-pitched boiler, with its forward dome and the interesting frame supporting a nice-looking polished brass leading axlebox, plus the plain trailing wheel, gave No. 1006 a delightful appearance. The eye was led from one harmonious feature to another, and the rich blue colour, and the Company's coat-of-arms on the splasher (this class being the first to be thus decorated) just gave the finishing touch. The whistle mounted on the right-hand side of the safety-valve does not show in my drawing, but a separate sketch gives the details of this standard G.E.R. fitting. To com-



Standard G.E.R. whistle. In some respects it recalls the design of Stroudley.

pare it with the one designed by Stroudley is an interesting experience for those who like engineering details. An end elevation of No. 1006 closely resembled that of *Petrolea's* little sister, No. 417, but some other dimensions will prove of use :—

Useful Dimensions of No. 1006.

Wheels	7 ft. and 4 ft. diameter
Leading overhang	5 ft. 0 in.
Trailing	4 ft. 1½ in.
Wheelbase	7 ft. 9 in.
Wheelbase, trailing	8 ft. 9 in.
Cab width	6 ft. 9 in.
Cylinders	18 in. by 24 in.
Ports	1½ in. and 3¼ in. by 15 in.
Slide-valve : travel	3¾ in.
,, lap	⅞ in.
,, lead	¼ in.
Weight on leading wheels	13 tons 5 cwts. 2 qrs.
,, driving ,,	16 tons 2 cwts. 2 qrs.
,, trailing ,,	10 tons 15 cwts. 2 qrs.
Centre line of boiler	7 ft. 6 in.
Chimney above rails	12 ft. 11 in.
Diameter of smokebox	5 ft. 1½ in.
Centres of leading springs	6 ft. 10 in.

CHAPTER XII

"ENGINES BUILT IN LONDON"

North London Railway No. 48

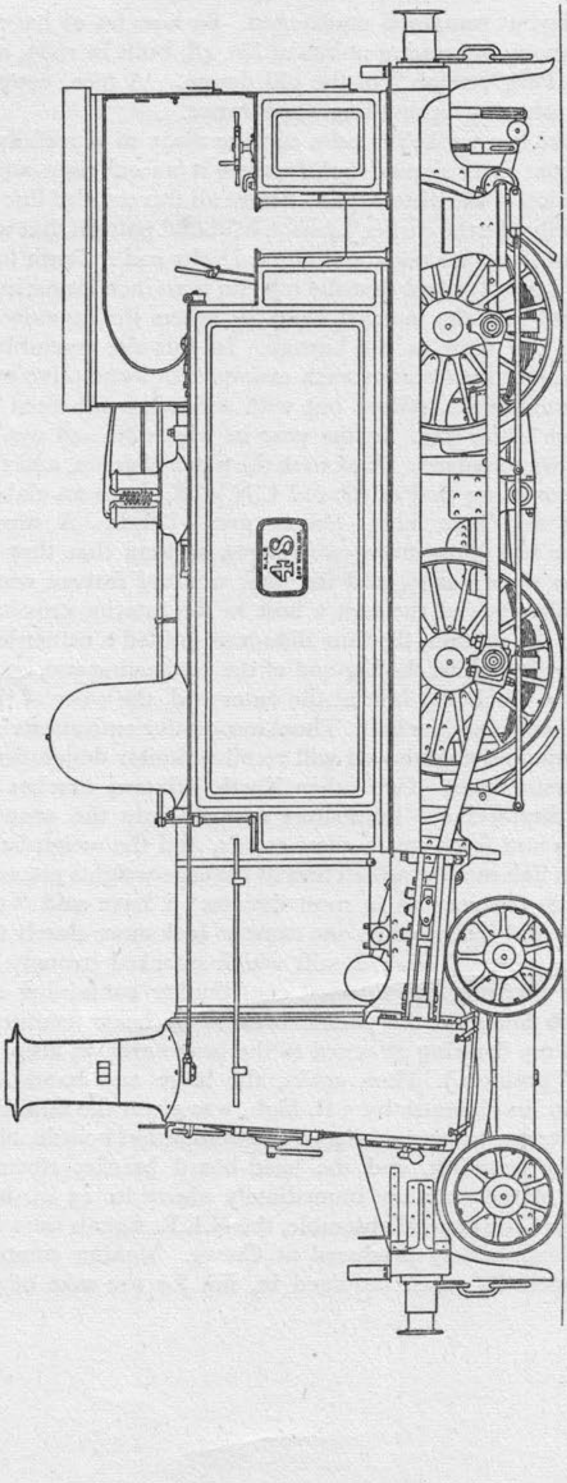
IN some ways it was a good thing that the N.L. Railway did not send a real locomotive to the Paris Exhibition of 1889. The company contented themselves with showing a one-eighth scale model of their standard passenger tank—and a very fine model it was. The advantage of such big-scale work has always been that it brings with it the possibility of estimating with great accuracy the true appearance of the prototype. To place one's eye alongside such a model is the next best thing to standing alongside the very engine itself, and, though it brings with it the problem of storage, I for one am never tired of singing the merits of the " large-scaler." This particular model gave all the world a chance to see what the Londoners could do when they turned their attention really seriously to the fascinating art of modelling—a skill, one rejoices to note, which manifests itself in still greater degree today, despite the bewilderments of a modern world. What a jolly engine was No. 48 ! A real Londoner if you like. The original design came from an eminent engineer who, in his time, held supreme sway at no less than three of London's locomotive works. No. 48 was built in London and passed her long life as a most familiar friend of the citizens of the great metropolis whose daily travels took them from the heart of the city to the numerous northern, eastern and western suburbs.

It all began in 1853 when that remarkable man, Mr. William Adams, who had been trained as a marine engineer in East London, and had some experience at sea, came to the North London Railway. He planned and built the company's new works at Bow, invented his universally known four-wheeled side-play bogie, and designed three classes of engine before passing on to become chief at Stratford (G.E.R.) and Nine Elms (L.S.W.R.) respectively. The last of these three classes is the one now under review. Between the years 1868-1907, 74 of them were built, the last survivors being withdrawn in 1929. Very naturally, as time passed, some of the details were brought up to date by the two successors of Adams—Mr. J. C. Park (1873) and Mr. H. J. Pryce (1893)—but the fundamental layout remained unchanged. So now let us have a glance or two at the many interesting points of No. 48, built in 1883, and therefore a " J. C. Park version " of the old design. A nice, compact little engine with a pleasing upstanding appearance.

First, picture her smokebox sides curving away so gracefully over the cylinders, its front cover sloping slightly, since it is set at right-angles to the 1-in 20 inclination of the piston-rods. Above all this stands a fine chimney, so extraordinarily like the earlier Johnson Midland pattern that we wonder for the moment if we are not standing on Derby soil ! Truth to tell, it is almost an exact copy, except that the top rim is an inch larger in diameter (2 ft. 3 in.) and that the internal chimney tapers the opposite way, i.e. smaller at the top than at the bottom. In this she resembles *Edward Blount*. One cannot recall many such examples in locomotive practice.

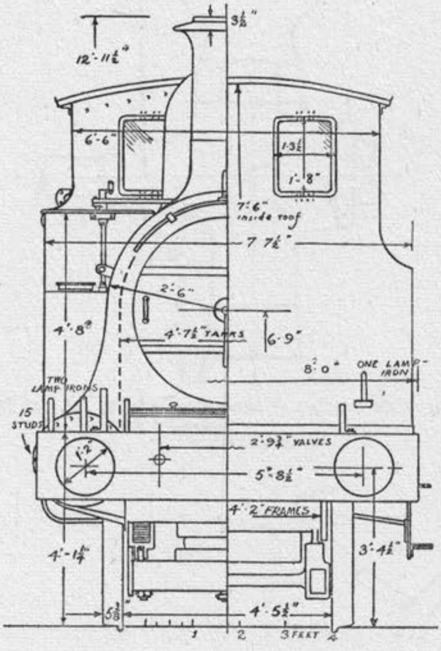
She is painted green, picked out with a black band lined on either side with a fine white line. In the year in which No. 48 was built the colour scheme was changed. Black took the place of green, and the lining-out—much resembling that of the old L.N.W.R.—was an elaborate one of red, white and light blue—almost grey—bands. A nicely-dished smokebox door was hung from two hinges, so long that they only terminated at the door's edge, and its other unusual feature was a single fastening handle screwed through a boss in the interior crossbar.

Turning to the motion, the four slide-bars guided a rather long 15 in. pair of slide-blocks, whilst the big-end of the connecting-rod was a forked one, closed by a block and bolt at the outer end, the wear of the brasses taken up by a wedge and its bolt. Those locomotive enthusiasts who know the Webb compound engine well will recall a similar design fitted to the celebrated *Jeanie Deans*. Two other North Western touches were the Ramsbottom displacement lubricators screwed into the centres of the cylinder covers and front steam-chest covers, and the weigh-bar shaft of the Stephenson link motion, which had its balance-weights placed forward of it and not to the rear as in most designs. I have said " two other N.W. touches," but really, when one came to look more closely at No. 48, there were a number of other details which smacked strongly of Crewe practice. For instance, the internal coal bunker containing the steam cylinder, which actuated the engine brake. (A heavy counter-balance can be seen in my drawing attached to the brake-arm, to keep the brake at the " off " position.) Then again, the large and handsome dome cover, 2 ft. 6 in. in diameter by 3 ft. high, was given the familiar outline of the Webb design, to say nothing of the destination boards, black, with nice firm white lettering, and the head-board bracket riveted to the left-hand side of the chimney immediately above its 13 in. high base. And, of course, in the general ensemble, the N.L.R. signals were extremely like the steel-arm variety produced at Crewe. Making comparisons is rather fun, especially when indulged in, not for the sake of finding a

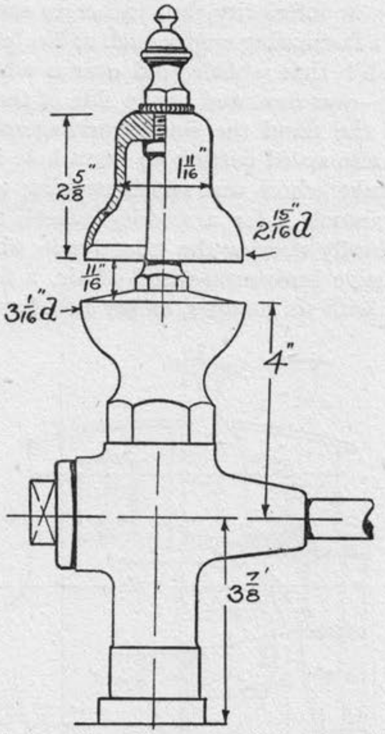


A beautiful green tank engine, a joint product of William Adams and J. C. Park.

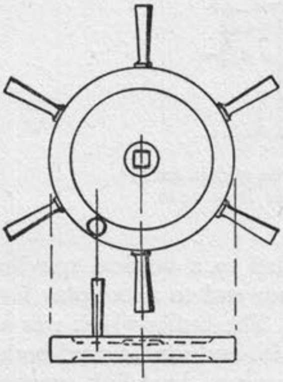
supposed superiority or inferiority, but rather to savour to the full the particular details of a fascinating engine such as No. 48 undoubtedly was! The tiny whistle—ah! that whistle (did ever a whistle scream such a high-pitched note?)—was mounted at the side of the safety-valve. This at once brought to the mind the similar arrangement on the Holden G.E.R. engines. It also saved cutting an extra hole in the outer firebox plate! The handbrake wheel was worth peeping at too. No wonder some of the boys mistook it for a steering wheel, and vainly tried to imagine the driver busily steering the whole train when running bunker first! It was a massive horizontal-wheel affair, a foot in diameter, its thick 1½ in. rim set with six handles, to say nothing of an extra one for luck which stuck up vertically! It was attached to a vertical spindle which rejoiced in a spherical bearing at its upper end to allow play for the arc-like movement below of the brake-arm. The buffer-plank was a plank indeed, measuring 8 ft. by 1 ft. 5 in. by 6 in. and sandwiched both sides by thin steel plates. From its centre hung a three-link wagon coupling. The radii of the ends of these links were rather larger than usual, giving a typical North-London effect. (Strange how these little details



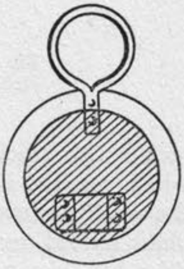
The difference in the levels of the outward curves of front and back cab sheets can be clearly seen. Note the large 14 in. buffer head.


2 5/8"
1 11/16"
2 15/16" d
11/16"
3 1/16" d
4"
3 7/8'

One of the smallest of locomotive whistles. A real Italian soprano.



A steering-wheel? Of course not – only the N.L. Ry. hand-brake wheel.



A fine big handle with a small headboard attached thereto! Very quaint.

catch the eye, but when faithfully reproduced they all help to give the right atmosphere to our model.) So would the shape of the fine big square windows, the frames of which were hinged on vertical pins top and bottom, so that to open they were rotated in a vertical plane. Finishing touches come in the shape of the quaint little 10½ in headboards, with their enormous iron ring handles. These boards were white, or white with black spot, or red with white cross. Side elevations (as in the case of so many other engines) hardly do justice to our little tank engine. With her strange—nay, inconvenient—absence of platform over the slide-bars, and the contrast of curved smokebox and square-sided tanks, she must be seen in perspective to be enjoyed to the full.

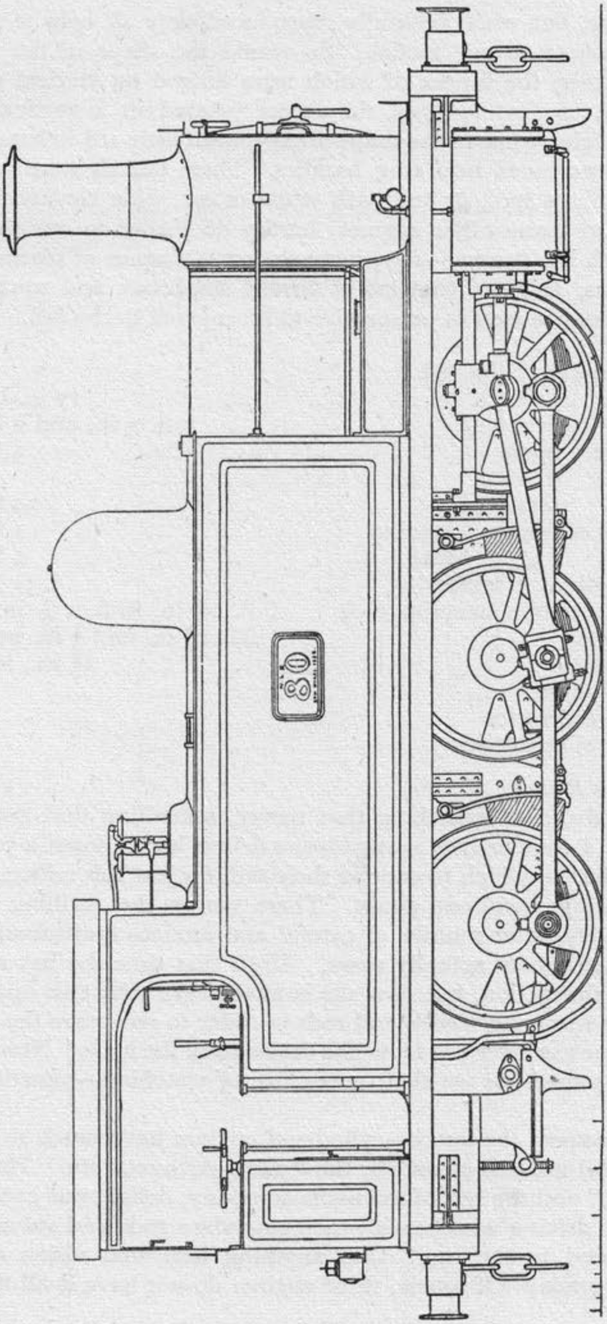
Useful Dimensions of No. 48.

Cylinders	17 in. by 24 in.
Wheels	5 ft. 5 in. and 2 ft. 9½ in.
Wheelbase : bogie	5 ft. 8 in.
,, driving	8 ft.
,, total	20 ft. 8¼ in.
Overhang of frames : leading	1 ft. 4 in.
,, ,, rear	5 ft. 6¾ in.
Total length over buffers	31 ft. 4 in.
Centres apart of connecting-rods ...	6 ft. 1½ in. (6 ft. 1 7/16 in. length)
Steam ports	1⅜ in. and 3 in. by 14½ in.
Lap of valve	1⅛ in., lead ⅛ in.
Travel of valve	4½ in.
Throw of eccentrics	6½ in.
Diameter of eccentrics	15¼ in.

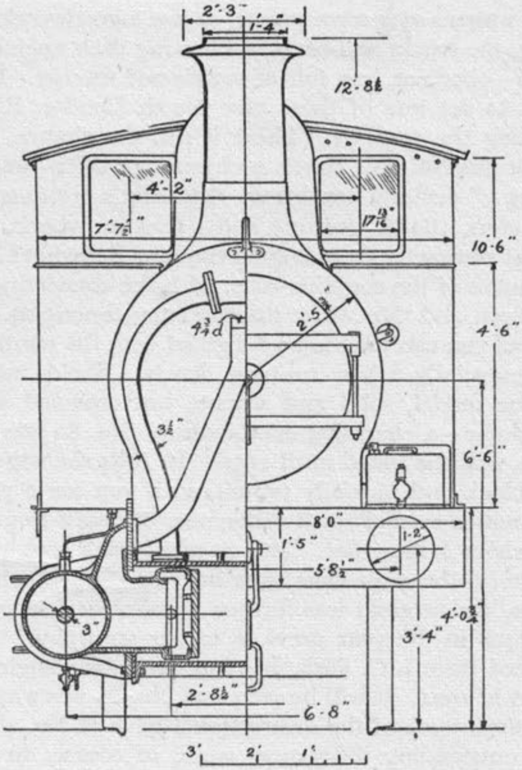
North London Railway No. 80

Everybody loves something that moves, something that goes round and round. I wonder how many locomodellers have chosen a particular type of engine on which to expend their skill for just this reason. A very high percentage, without doubt. There comes the thrilling moment when, one day, after months of careful and anxious craftsmanship, our newly-created model actually *moves*. Until that time she has remained a type, an abstraction, but now she is alive! We seize this opportunity of watching revolving wheels and rods in order to recapture the spell her big prototype cast over us. How like the original she looks! Now, indeed, we possess something we shall never tire of watching—something that moves.

In this respect the outside-cylindered engines have much to offer us. The beautiful modern examples, the "King Arthurs," the "Halls," the "Mallards," and the rest of the noble company, delight our eyes. Three lovely great driving wheels, with their attendant rods and valve-gear all flashing round in the sun! Can anything beat that vision of speed, power and grace? Of course, these engines do not have it all their own



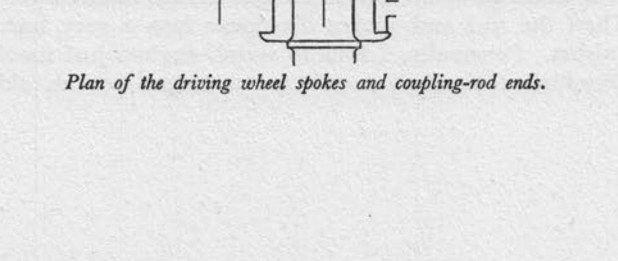
A fitting fellow to the N.L.Ry. passenger tank class. How this design grows on one!



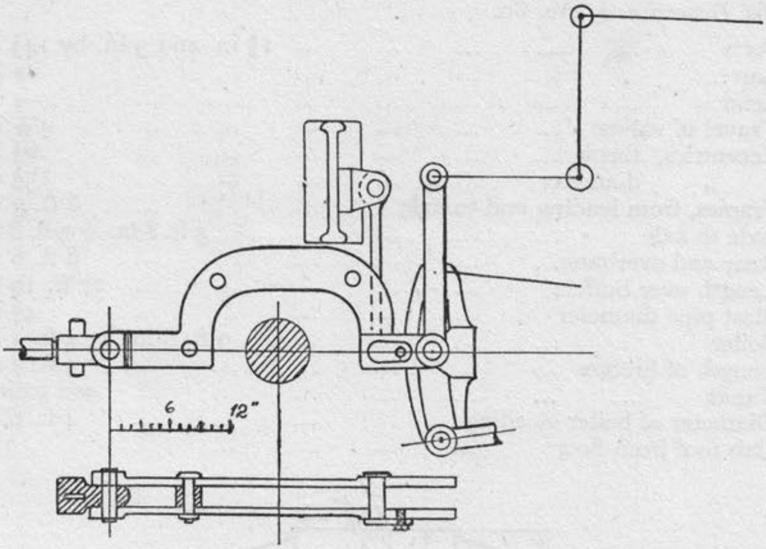
No. 80 *was a solid-looking engine viewed from the front end. Plenty of pep here* !

way. One recalls the pleasure of the inside-cylindered brethren as well. Think of the Aspinall's L. & Y. No. 1093 moving along the line, her coupling-rod momentarily hidden from sight at each revolution ; or the thrill of the outside cranks of a G.W. " Duke " almost flinging themselves off their axles in the mad whirl of the dance !

Paradoxically, no movement seems almost as good as much movement ! Picture a G.W. 4-2-2 *Wigmore Castle*, with every wheel all but hidden behind massive framing, beating time solely by the swing of the enormous balance-weight in the rim of her driving wheel. There is so much fun to get out of all sorts and conditions of locomotives, isn't there ? And remember, speed is not the essential thing that matters. How disturbing it is when an over-enthusiastic pal lets his model have too much head ! Then the rod and spokes disappear into a grey haze and the vision vanishes. Personally, I love to watch engines just moving out of sheds—stretching their limbs, so it seems to me—or an old shunter, banging a few wagons over some points, or else a goods train comfortably ambling along, the trucks half-eagerly following their engine, like a pack of young dogs—obedient, yet full of suppressed energy. Did you ever have the luck to see one of those nice North London Railway goods engines "leading the pack"? (There is still the chance, even today.) Have a look at old No. 80. Here's a charming puffer—and sturdy too. "Pull anything!" declares her driver. And that's pretty true, for 17 in. by 24 in. cylinders, 160 lb. pressure and 4 ft. 4 in. wheels, with 44 tons adhesive weight resting on them is good enough. But what I like about her is the arrangement of the coupling-rods, with the connecting-rod driving on their centre pin, and those three massive balance-weights. Watch that lot go round and you can't fail to be delighted with the resulting harmony of motion; especially when running slowly. She'd make an ideal shunting engine model, solid and square, but crowned with a lovely chimney and dome—a charming combination. No. 80 was built at Bow Works in 1882, and she lasted until 1936! In 1894 she was re-numbered 111, painted black and partially rebuilt, so if you see a picture of her thus you will notice several small differences of detail from her original condition in which I show her. This re-numbering took place because another No. 80 (of the same class) was built in 1894. Owing to various amalgamations, the original was further re-numbered 2633, then 7508, and finally 27408 in the year previous to her scrapping! The original design emanated from J. C. Park, in 1879, and thirty engines comprised the set, the last in 1901. It will be seen that No. 80 was a typical N.L.R. product, and that much of the description I gave of No. 48 applies also to her. The outstanding differences were, of course, in the cylinder arrangement and wheels. On account of their low position it was hardly possible to continue the smokebox sides downwards to their lagging-plates. To avoid a deep motion-plate a single slide-bar was employed, the slide-block which embraced it being as long as 15¼ in. The coupling-rods (painted black with bright ends) had no knuckle-joint; both the inner ends took up on the crank-pin. This feature, and a section of the H-shaped wheel spokes can be seen in my plan. These cast-iron wheels



Plan of the driving wheel spokes and coupling-rod ends.

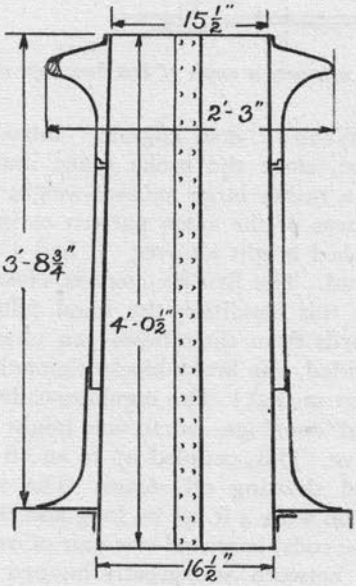


The intermediate valve rods were a couple of bent bars, kept rigid by distance-pieces.

resembled those of Webb's " coal engines " introduced on the North Western in 1873 and, since the spoke space immediately below the crank-pin was solid, a rather large balance-weight had to be provided. The connecting-rod was of the same pattern as in the passenger tank engines and was finished bright all over. It had a 3 in. gudgeon-pin in its solid-eyed small-end. The first six engines, Nos. 75-80, were painted green originally. In this condition the hand pillars of the cab were painted 12 in. upwards from their bases—an unusual touch. A hand brake only was provided, the brake-blocks themselves being of wood—and only four of them at that ! The regulator-valve was of the circular disc type with radial openings—what one might call the old Sharp, Stewart butterfly valve. This, coupled up to an 18 in. handle, made for ease in opening and shutting off steam. The eccentric-rods of the Stephenson link-motion were 4 ft. $4\frac{3}{4}$ in. long and the intermediate valve spindle (or in this case rods) consisted of a pair of rods bolted side by side with distance pieces between and greatly hooped to clear the leading axle. The outer ends were swung from a supporting swing link. The centre and rear springs were attached to equalising-levers (hidden by the rods and wheels) and all spring hangers had adjustable screw ends. So, you see, No. 80 was thoughtfully provided with a good many excellent refinements, and I hope that the model of one in South Kensington Museum will persuade you to have a shot at modelling this sturdy and interesting old friend.

Useful Dimensions of No. 80.

Ports	1⅜ in. and 3 in. by 14½ in.
Lap	1 in.
Lead	⅛ in.
Travel of valves	4 7/16 in.
Eccentrics, throw	6½ in.
,, diameter	15¼ in.
Frames, from leading end to axle	6 ft. 3 in.
Axle to axle	5 ft. 8 in. + 5 ft. 8 in.
Rear end overhang	6 ft. 6 in.
Length over buffers	27 ft. 10 in.
Blast pipe diameter	4¾ in.
Boiler	9 ft. 8 in. by 4 ft. 1 in.
Length of firebox	5 ft. 2 in.
Tanks	950 gallons
Diameter of boiler cleading	4 ft. 6 in.
Cab roof from floor	7 ft.



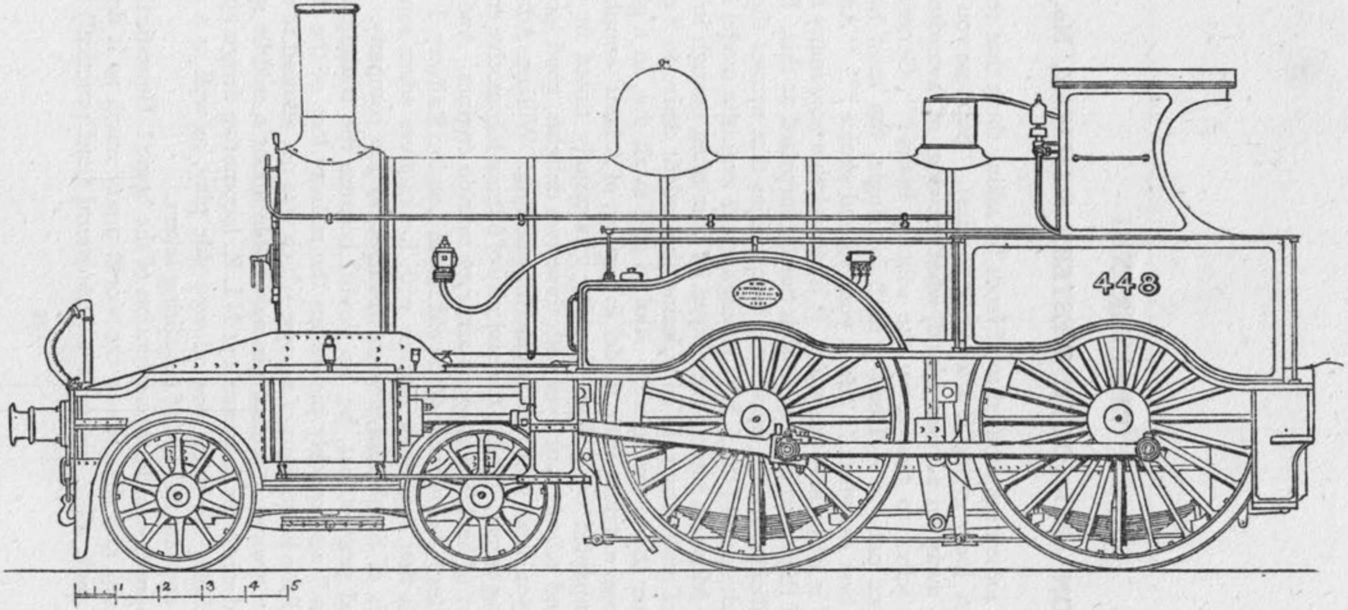
Smaller at the top than at the bottom!
An unusual taper.

CHAPTER XIII

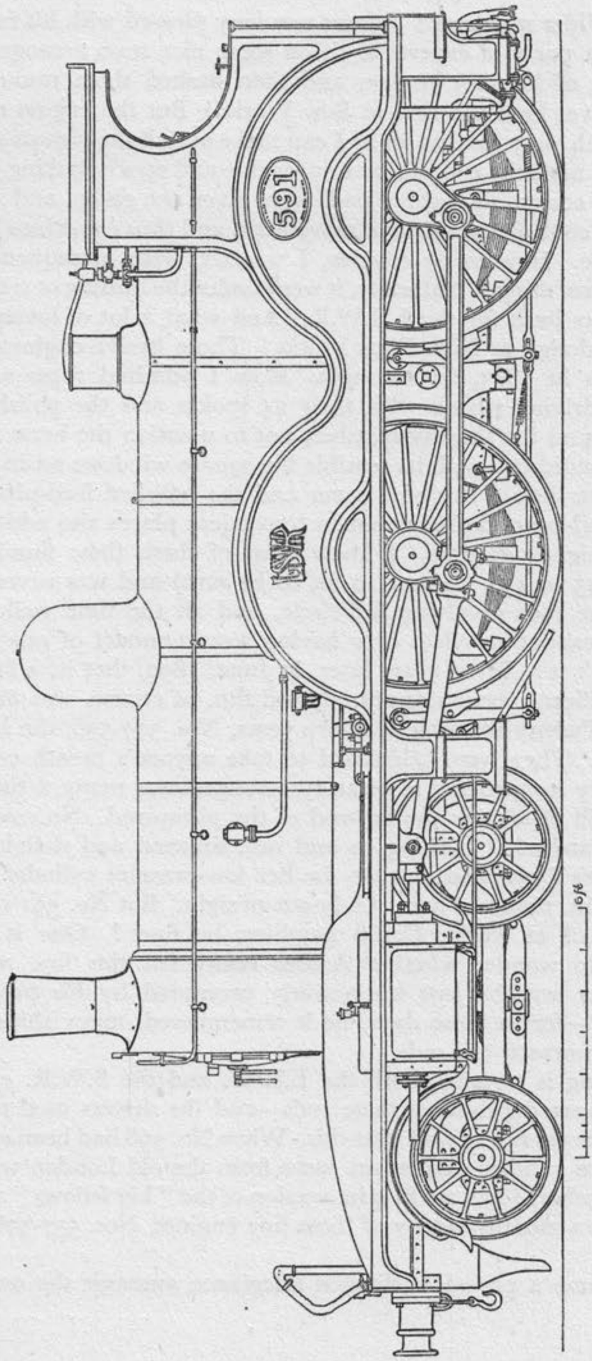
LONDON AND SOUTH WESTERN RAILWAY, No. 591

I HAVE sometimes amused my friends by asking them that celebrated question (only giving it a locomotive bias), " Suppose you were to be cast away on a desert island, what drawings of favourite engines would you select to pass away the solitary hours ? " Generally, the answer somes pat : " A Dean 7 ft. 8 in. single, the most handsome locomotive ever designed." " And your second choice ? " " An Adams 7 ft. 4-4-0," is frequently the reply. It is remarkable how many admirers there are of these two classes. One is hardly surprised at this. Beautiful lines and efficient service must ever be qualities that attract the model-maker. In the case of the L.S.W.R. engine, the exquisite model in South Kensington Museum must have played its part often enough in fanning the flames of enthusiasm, in stimulating the ardent desire to " go home and do better than ever before." And to add to all this, in a glass case nearby reposes a dainty little model in copper, of Adams' annular blast-pipe, accompanied by a scale drawing charmingly tinted in prussian blue. Go and refresh your eyes with these two delights, good locomodellers, when you next visit our wonderful museum. William Adams had an interesting career. Unlike the majority of famous locomotive engineers, the first part of his life was spent amongst marine engines. And no bad training either ! As engineer of the old North London Railway, I imagine he made his first real acquaintance with locomotives when some 4-4-0 tank engines of Stephenson's were delivered to the company. Having spent several years afloat, he, no doubt, became the traditional naval " handyman " and quickly picked up the railway lore of the day. He soon spotted the limitations of a bogie which was not allowed to do more than revolve around a central pin or wobble about a middle spherical support, and when his first excellent N.L.R. locomotive design appeared, lo ! and behold, the bogie was allowed side play, as well as a rotating movement, and the full use of equalising levers.

Here, indeed, was the emancipation of the bogie ! Henceforth it was allowed to slip and slide about the world pretty much as it desired, a few rubber pads alone giving it a little moral (and practical) support



The Stephenson L.S.W. seven-footers had wonderful 24-spoke driving wheels ; lovely engines, these.


591
LSWR
10 ft

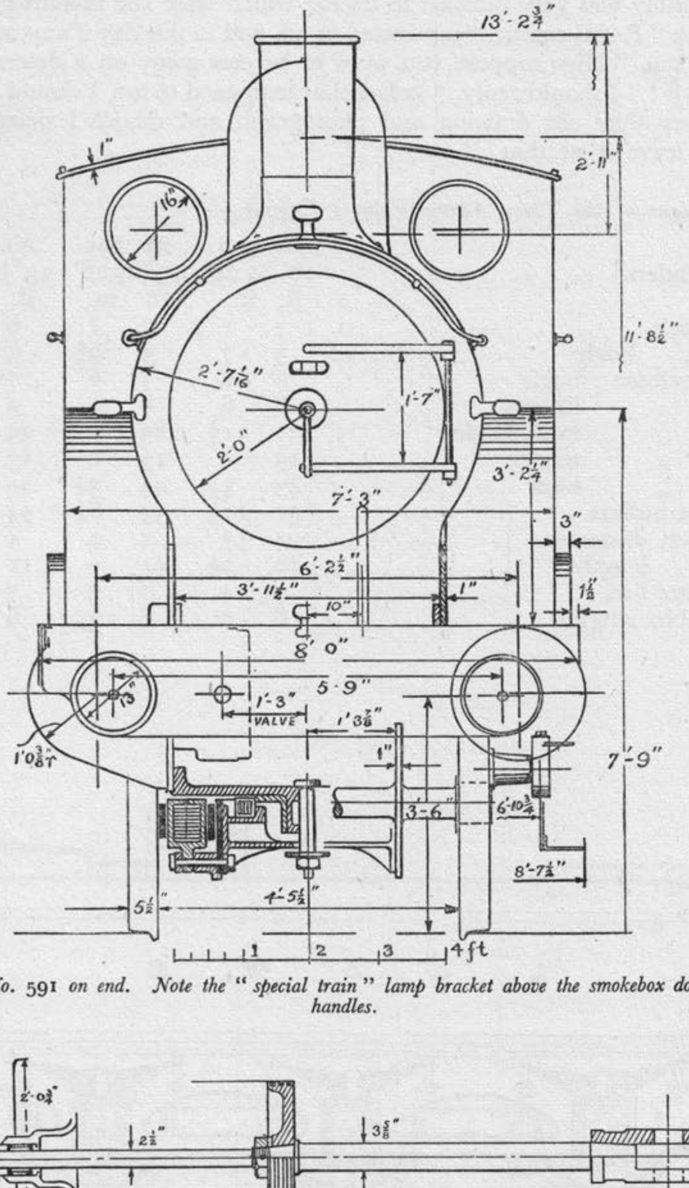
No. 591 *must be considered one of the classic designs of the English locomotive.*

during its wilder moments! Adams was very pleased with his new baby. He invited a party of experts to sit on some nice seats arranged on the buffer-beam of his new engine, and then dashed them round all the sharpest curves he could find in Bow Works! But the engine never left the rails; oh no; and as far as I can make out all the visitors remained safely seated until the end of that remarkable and epoch-making journey! Later on, of course, the rubber pads were given the go-by, and stiff plate springs took control of the lateral movement, and thus came into being the Adams bogie. How many engines, I wonder, were subsequently fitted with this clever thing? Naturally, it went under the leading or trailing end of his engines built for the L.S.W.R. And what a lot of lovely engines Adams did design at Nine Elms Works! Those twelve engines built by Stephenson's in 1883, for example. How I admired those wonderful 7 ft. 1 in. driving wheels with their 24 spokes and the polished brass beading around the shapely splasher, not to mention the brass numerals and the splendid cab with its sensible big square windows set in *mahogany* frames! The little 2 ft. dome cover and the polished feed-pipes, lubricators and oil-boxes dotted about in convenient places also added charm to these sprightly engines. I knew most of them (how familiar their numbers, 445 to 456, became to us, to be sure) and was never tired of watching the rods revolving full-circle, and all the time well in sight. And yet I cannot recollect ever having seen a model of one of them. Strange, isn't it? Seven years later, in June, 1890, that is, a larger and more magnificent version appeared, and this, of course, was *the* famous 591 class. Twenty were built in two years, Nos. 577-596, the last dated April, 1892. They were calculated to take anyone's breath completely away! They stopped my respiratory arrangements many a time! The greatest thrill of all was the tail-rod of the piston-rod. No cover at all. One just watched it flashing in and out, amazed and delighted! Of course, *Jeanie Deans* had one too for her low-pressure cylinder to guide that big 30 in. piston of hers. Only out of sight. But No. 591's could be watched hard at work. Could anything be finer? One is tempted sometimes to wonder whether Adams really felt this fine rod to be necessary, or was he just instinctively prompted by his past marine experience?—for in those days, be it remembered, many ships' engines were given uncased tail-rods.

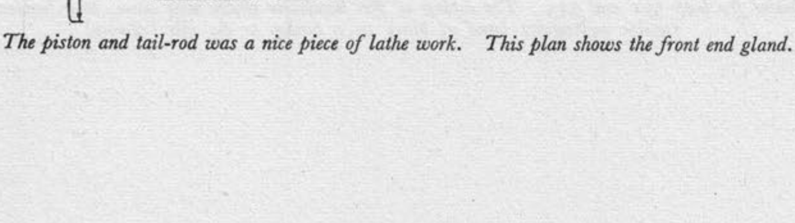
One thing is certain. Both the L.N.W. and the S.W.R. engines in later days were deprived of these rods—and the drivers used to declare the engines never ran so well after this. When No. 596 had been completed at Nine Elms another excitement came from the old London works.

In December, 1892, a 6 ft. 7 in. version of the "big fellows" appeared, and in eleven months twenty of these fine engines, Nos. 557-576, were at work.

Then came a period of divided allegiance amongst the enthusiasts.


13'-2¾"
1"
16"
2'-11"
11'-8½"
2'-7 1/16"
1'-7"
2'-0"
3'-2¼"
7'-3"
3"
6'-2½"
3'-11½"
1"
1½"
10"
8' 0"
5-9"
13"
1'-3"
VALVE
1'3⅞"
1'0⅜"r
1"
7'-9"
3'-6"
6'-10¾"
8'-7½"
5½"
4'-5½"
1
2
3
4ft

No. 591 *on end. Note the " special train " lamp bracket above the smokebox door handles.*

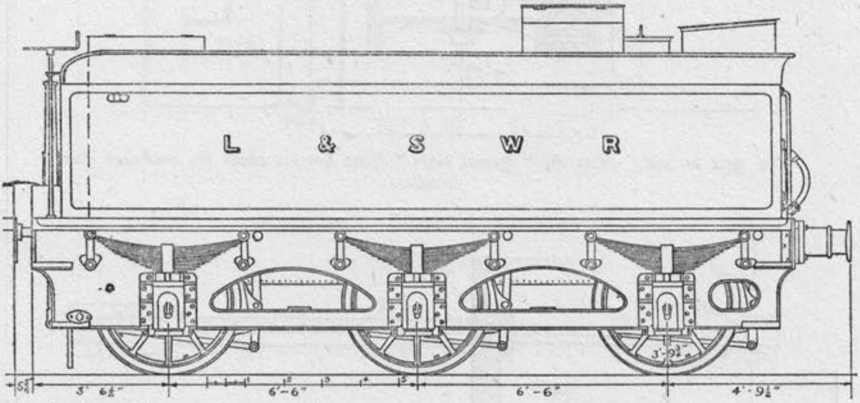


The piston and tail-rod was a nice piece of lathe work. This plan shows the front end gland.

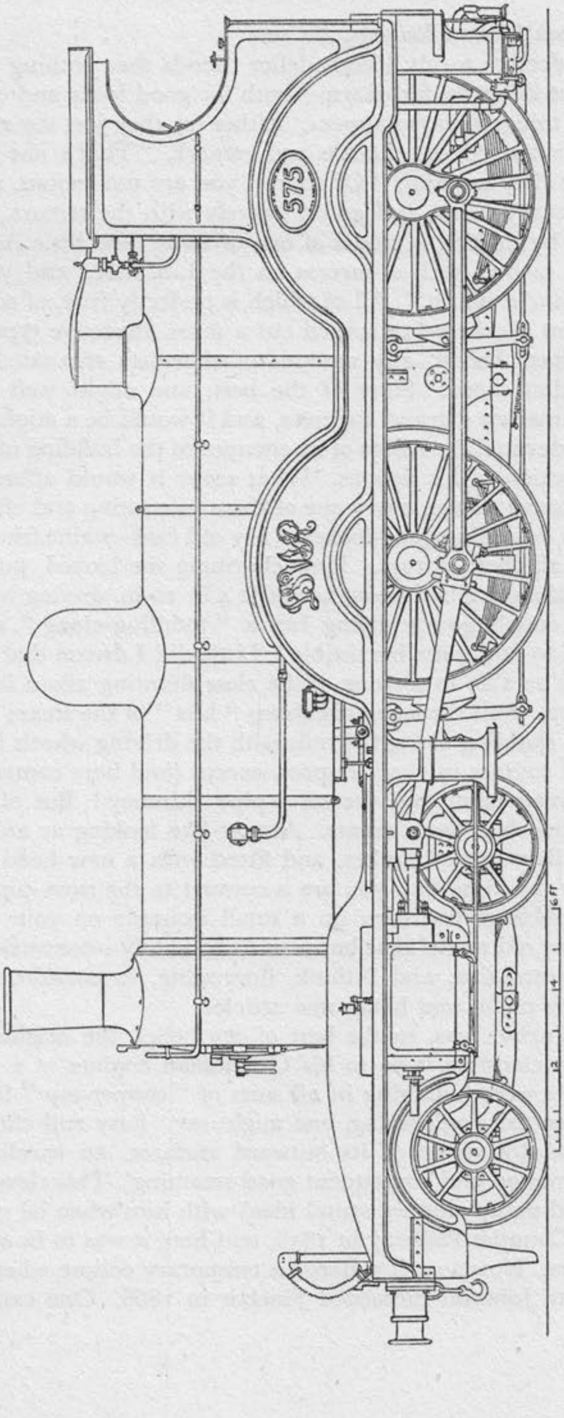
It certainly was very difficult to decide which were the favourites. No. 575, the "Royal engine," captivated us all, and to this day if anyone were to ask me, "Now suppose you were to be cast away on a desert——" "Stop it!" I should reply, "before that happened to me, I should gather up every jolly old drawing and photograph and model I possess—so there, leave it at that!"

Dimensions of the Three Adams Express Engines.

	No. 448		*No.* 591		*No.* 575	
Cylinders	18″ by 24″		19″ by 26″		19″ by 26″	
	ft.	in.	ft.	in.	ft.	in.
Wheels	7	1	7	1	6	7
,, bogie	3	7	3	9¾	3	7
Wheelbase : bogie	7	0	7	6	7	6
,, drivers	8	6	8	6	9	0
,, total, engine ...	21	11½	23	0	23	6
,, tender	13	0	13	0	13	0
,, total	43	5⅝	44	3⅛	44	9⅛
Over buffers	51	11½	53	8⅝	54	2½
Boiler, diameter	4	3	4	4	4	4
,, length	10	2½	11	0	11	0
Centre line	7	4	7	9	7	6
Firebox length	6	0	6	4	6	4



Tender for both 591 *and* 575. *The coping of this handsome tender was green, thus leaving a regular rectangular band of black as a border to the gilt lettering.*

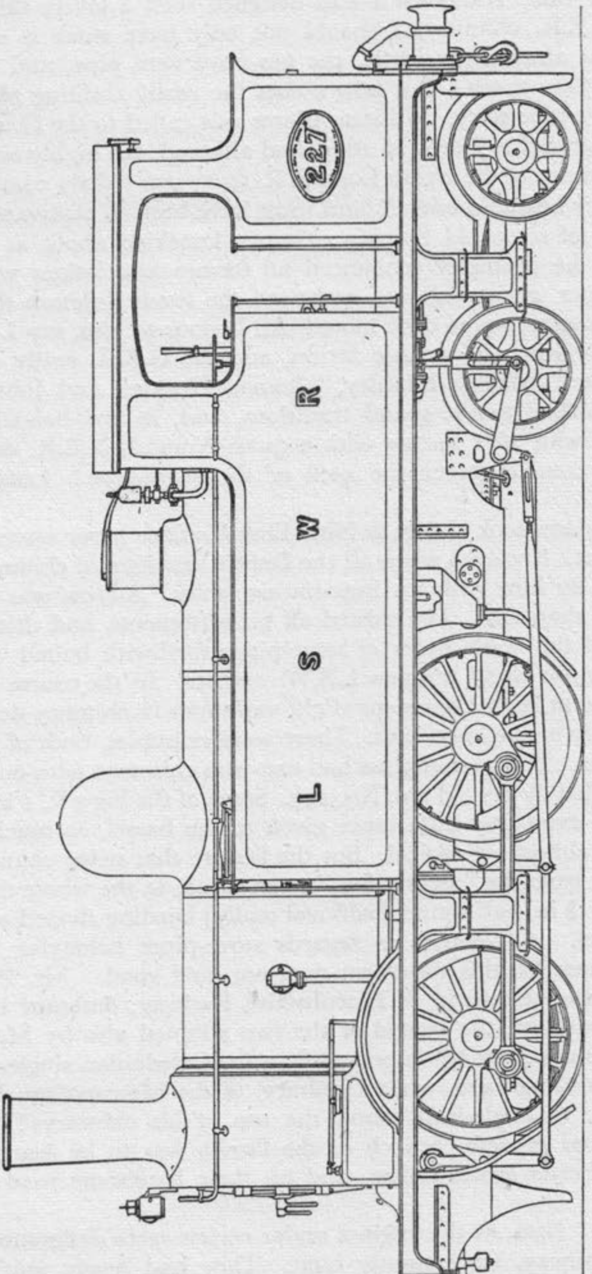

575
SWR
12
14
16 FT

Many think No. 575 equal to any design of the 'nineties.

London & *South Western Railway*, *No.* 227

When I declare to my locomodeller friends that nothing could beat the stove-pipe chimney for charm—both for good looks and character—one of three things always happens. Either (*a*) they just say rude things, (*b*) they give a mirthless chuckle and remark, "That's not funny, old chap," or (*c*) they exclaim, "Of course, you are not serious, are you?" But I stick to my point, and go on bravely with the remark, "You try out the idea by making a model of one of those dear little Adam's tank engines that proved such a success on the L.S.W.R., and you will be converted without doubt." All of which is perfectly true, of course. The old Nine Elms Works never turned out a more attractive type of engine—and, goodness knows, any amount of charmers emanated from the famous London shops. Sixty of the best, one might well call them. William Adams was a grand engineer, and it would be a mighty fine idea if some club devoted the whole of its energies to the building of a comprehensive collection of his designs. What scope it would afford! Adams designed so many classes, every one of them interesting and efficient, and most of them exceeding good-lookers. My old tank-engine friend No. 227 could claim all these virtues. How charming she looked, puffing away at the head of a suburban train, her little 4 ft. 10 in. driving wheels, with their heavy coupling-rods giving her a "toddling-along" appearance which I used to find quite irresistible! Little did I dream that years after I should still be able to see one of the class shunting about in Clapham Junction Yard. Still the same old sharp "hiss" of the steam brake, still the same old skidding along the rails with the driving wheels locked, still the same old engines in every respect, except (and here comes the tears) the lovely green paint and the stove-pipe chimney! But oh! what a difference these two items create. Almost like looking at an old friend in an unfamiliar suit of clothes, and fitted with a new head and face! Assuming by this time that you are a convert to the stove-pipe chimney (if you're wobbling, just turn up a small example on your lathe, and stick in on any old model that happens to be handy—conversion guaranteed), it is instructive, and I think, interesting, to consider the lineal descent of this useful and handsome article.

Robert Sinclair was, to the best of my belief, the originator of the design, boldly clapping it on to his Caledonian engines at a time when other railways were indulging in all sorts of "copper-top" frippery. A true bit of Scottish engineering, one might say. Easy and cheap in construction, and by virtue of its outward surfaces, an excellent aid to draught promotion and consequent good steaming. This clever engineer took this (and many another sound idea) with him when he migrated to the Eastern Counties Railway in 1856, and here it was to be seen for the next ten years. However, it suffered a temporary eclipse when the great Samuel Waite Johnson succeeded Sinclair in 1866. One cannot blame

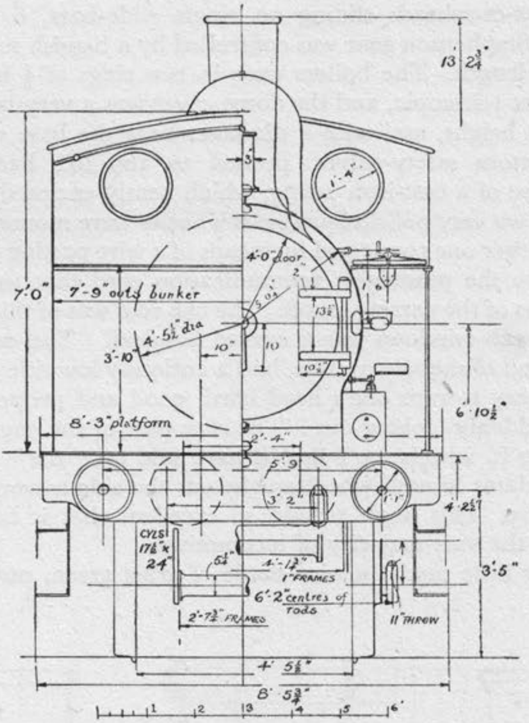

227
L S W R
12
14
16FT

This sturdy little fellow was one of the most charming members of the Adams family.

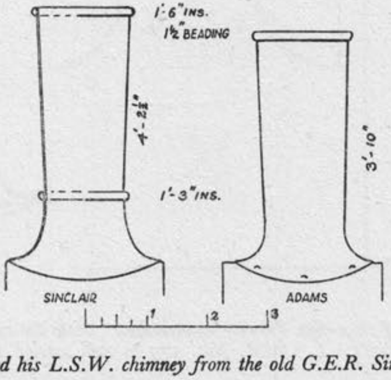
Johnson for this. I know if I had designed such a lovely thing as the Johnson G.E.R. chimney, I should not only have stuck it on all my engines, but also on the kettle, the gas-stove vent pipe, and anything else within easy reach! But now comes the really thrilling part of this strange stove-pipe story. William Adams was called to the G.E.R. when Johnson migrated to Derby in 1873, and although the highly ornamental Adam's chimney of the North London Railway was a daily commonplace (albeit a very beautiful one) Adams must have been so captivated by the appearance of some old Sinclair chimney knocking about at Stratford Works that he promptly renounced all former associations with ornamental copper work, and even eschewed the lovely Johnson thing, and reinstated the stove-pipe once more! All honour to him, say I. His was a thoroughly wise and artistic action, and the G.E.R. really never got over it either! Massey Bromley, Thomas Worsdell and John Holden remained faithful to the grand traditions, and, lo and behold! today Stratford Works, after flirting with a quasi-Worsdell N.E.R. design, are once more coming under the spell of the stove-pipe! Long may it flourish!

When Adams took charge at Nine Elms his faith never wavered. Not for a moment. Not even when all the Beattie ornamental chimneys came and puffed by him with an ingratiating smirk. Adams was made of sterner stuff than that. He resisted all blandishments, and this doughty champion of the noble order of stove-pipes forthwith bolted the neat, simple design on to all the new L.S.W. engines. In the course of his 17 years' regime at Nine Elms some slight variations in chimney design took place—mostly at the lower end. There were examples, both of high and also low bases. The later engines had cast-iron chimneys with no separate base, as carried by my old pal, No. 227. Some of the big 7 ft. 1 in. express engines had extremely little taper given to the barrel, so much so that they looked almost cylindrical. But the feature that never changed, and which really gave the " expression," so to speak, to the whole thing, was the 1½ in. by ⅝ in. half-round (half-oval really) beading riveted to the top of the barrel. Of course, as regards stove-pipes belonging to other railway companies, this statement does not hold good. Mr. Parker on the Manchester, Sheffield & Lincolnshire Railway, designed two most interesting variants, the second of the two adopted also by Mr. Pollitt. Old Ben Connor gave his famous 8 ft. 2 in. Caledonian single-wheelers another interesting form, while Hanbury, of the Metropolitan Railway, shoved a bit of angle-iron round the top of his chimneys! Another interesting and graceful branch of the family was to be found on the Aveling & Porter steam-rollers, and on their handsome road traction engines.

The " O " class, as the engines under review were designated by the Southern Railway, were stoutly built. They had heavy motion with


13' 2¾"
3"
1'-4"
4'-0" door
2"
5'-0½"
1'-6"
7'-0"
7'-9" outs bunker
13½"
4'-5½" dia
3'-10"
10"
10
10½"
6'-10½"
8'-3" platform
2'-4"
5'-9"
3'-2"
1'-1"
4'-2½"
CYLS 17½" x 24"
5¼"
4'-1¾"
1" FRAMES
6'-2" centres of rods
3'-5"
2'-7¾" FRAMES
11" THROW
4' 5½"
8' 5¾"
1
2
3
4
5
6'

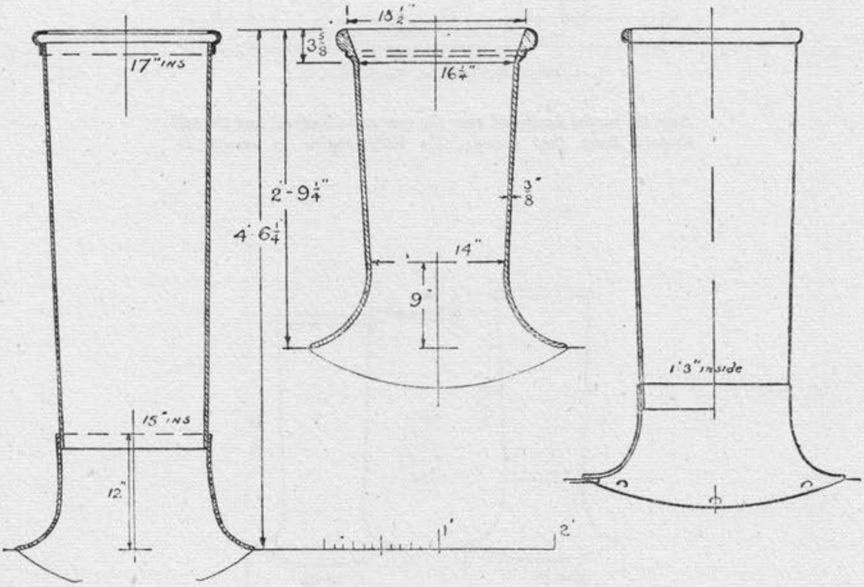
Note the useful hand-rail over the rear cab-windows and the tall shapely dome that becomes the little engine so excellently.


1'-6" INS.
1½" BEADING
4'-2½"
1'-3" INS.
3'-10"
SINCLAIR
ADAMS
1
2
3

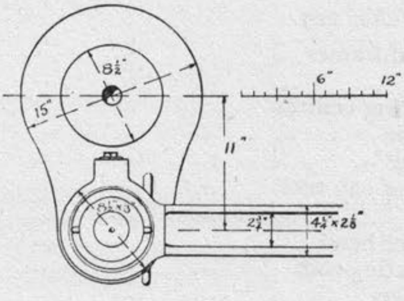
Adams derived his L.S.W. chimney from the old G.E.R. Sinclair design.

whopping box-crossheads sliding on single slide-bars, 6 in. by 3 in. section. The Stephenson gear was controlled by a biggish reversing lever, 5 ft. 3 in. in length. The boilers were in two rings of ½ in. steel, flush jointed and not telescopic, and the dome cover was a very large example, 2 ft. 10 in. in height, and with a diameter near the base of 2 ft. 4½ in. The Ramsbottom safety-valves, pressed to 160 lb., had the rather unusual feature of a cast-iron casing, which neatly enclosed the columns and spring. Two very polished-up brass whistles were mounted in front of the cab, the larger one connected by means of a wire passing over two outside pulleys, to the passenger communication cord that used to dangle along the edges of the carriage roofs. The cab roof was of thick wood, and over the rear cab windows was a curved handrail. The cabs, although comfortable and of shapely outline, had a curiously low side opening, and it was quite easy to ram one's head hard, good and proper, against its edge when suddenly looking out! The rear part of the engine rested on a bogie with 3 ft. wheels, or I should have said on "the" bogie, seeing that it was Adams himself who brought out the side-traversing bogie in February, 1865. This bogie proved so excellent that it has been used ever since on the vast majority of locomotives.

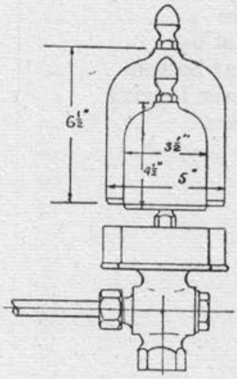
Paint your little model a nice shade of grass green, putting a black



Three interesting methods of stove-pipe chimney construction. Note the curious beading of Connor's and the massiveness of Pollitt's. L.S.W.R. Nos. 177 *to* 226 *carried the third type shown here.*



The heavy coupling-rods look well against the small 4 ft. 10 in. driving wheels.



The small alarm whistle was placed at 6 in. centres from its bigger fellow—surely one of the largest ever used for ordinary signalling purposes.

border and inner fine white line around the tanks, frames, footsteps and splashers. The brass edging to the splashers and around the smokebox angle-iron will look well, and don't forget the handsome brass number-plate (2 ft. by 1 ft. 3 in.) with its red background. Buffer-sockets and buffer-beam should be plain red, and isn't it curious the way the little 5½ in. gilt letters L.S.W.R. are placed on the tank sides ? The centres of the letters are 2 in. above the true centre-line of the tanks themselves !

Now, isn't she a little dear ?—and when you see your model " toddling along " you will share with me the joys of the days when William Adams reigned at Nine Elms.

Sixty engines, numbered 177 to 236, were built between December, 1889, and March, 1895. The last ten were the ones fitted with the plain cast-iron chimney.

Useful Dimensions of No. 227.

Front overhang of frames	5 ft. 6 in.
Rear	1 ft. 9 in.
Wheelbase : driving centres	6 ft. 10 in.
,, bogie	5 ft. 0 in.
,, total	20 ft. 4 in.
Footplate to top of cab roof	7 ft. 0 in.
Length of buffer	1 ft. 5½ in.
Diameter of buffer head	1 ft. 1 in.
Centres of connecting-rods	5 ft. 5 in.
Centres of cylinders	2 ft. 4 in.
Diameter of cylinders	1 ft. 5½ in.
Stroke of pistons	2 ft. 0 in.
Clack box to tube plate	2 ft. 2 in.
Dome centre to tube plate	5 ft. 8¼ in.
Diameter of dome cover at top	2 ft. 4 in.
Diameter of dome cover at bottom	2 ft. 5 in.
Height of dome cover above lagging	2 ft. 10 in.
Total length of 1-in. frames	27 ft. 7 in.
Steam ports	14 in. by 1⅜ in.
Exhaust ports	14 in. by 3½ in.
Valve travel	3¾ in.
Lap	⅞ in.
Lead	⅛ in.
Throw of eccentrics	5¾ in.
Diameter of eccentrics	15½ in.
Width of cab	7 ft. 9 in.

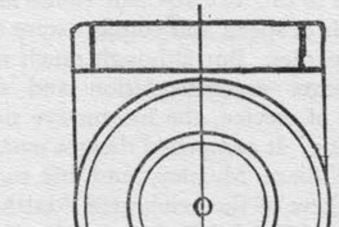
CHAPTER XIV

L.C.D.R. RAILWAY, No. 145

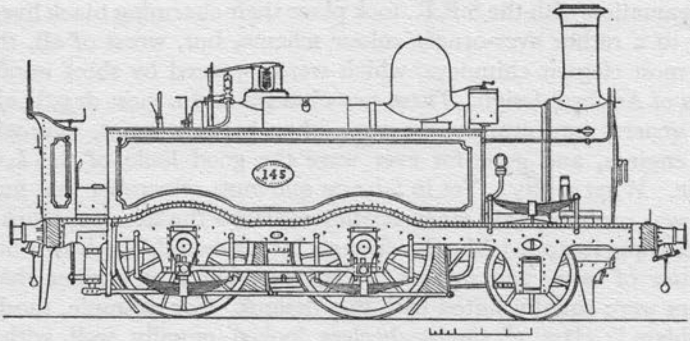
YEARS ago the mere mention of the London, Chatham and Dover Railway was enough to provoke sarcastic smiles and remarks from those whose standards of speed and comfort were derived from the major British railway companies. But although much might have been wanting as regards passenger accommodation and such matters as punctuality and frequency of service, the locomotive stock in itself was both excellent and interesting. It comprised designs emanating from two very sound engineers : William Martley, and his successor, William Kirtley. The latter, a nephew of the celebrated Matthew Kirtley, had risen to high position on the Midland Railway at Derby, before leaving for the South to settle down in a London suburb and take charge of Longhedge Works at Battersea. Here he had a near neighbour in the person of William Adams, hard by at Nine Elms, and the two chiefs proceeded to turn out from their respective works real London-built locomotives second to none in finish and performance.

The first task that fell to the lot of the Longhedge engineer was to maintain and reboiler the earlier Martley engines—a job somewhat similar to the one that faced William Stroudley in his early days at Brighton. Standardisation was a thing unknown on either railway system, and although such a state of things was most interesting in the variety of types it presented to the gaze of the enthusiast, it must often have given these talented gentlemen some busy and anxious thoughts. Out of such a medley of types, half a dozen little side-tank engines commend themselves to the locomodeller, partly on account of their trim appearance and partly because they never ran with covered-in cabs, thus giving the " driver " of our miniature easy access to the various controls.

These old Martley locomotives (already converted by their designer from tender to tank engines) came in for boiler rebuilding in 1876 and the following year. Their original numbers 65 to 70 were then altered to Nos. 145 to 150 and their names, *Onyx*, *Emerald*, *Diamond*, *Ruby*, *Amethyst* and *Pearl* were not perpetuated. The new Kirtley boiler, of course, had the standard L.C.D.R. mountings ; a nice dome, a Ramsbottom safety-valve with polished brass columns and vermilion spring, the long brass blower-valve and an extremely handsome chimney. The firebox front at the driver's end was edged with brass, as was the weather-board, and a nice brass number-plate with black background adorned the tank side. Quaint touches were afforded by the handrail which circled over the top of the smokebox, and a rectangular sandbox set up on high. The outside frames and cranks (both black, lined with fine red lines) were of pleasing shape, and the polished coupling-rods with adjustable cottered ends looked well against the background of underhung springs. How pretty these little engines were as they puffed along in their cheerful way ! Quite old-world in one sense, and yet modern and up to date with their Kirtley touches. Black was their colour, relieved with a grey band which was bordered inside with a thin yellow line, and outside with a fine red line. The corners of this band were turned with a reversed quarter circle —a feature later changed on the " Chatham " to the more usual curved angle. The vermilion buffer-beams carried big gold numerals which were shaded black, the buffer-sockets were black, as was the border to the beam itself. The headlamps were painted red—a rare colour in those

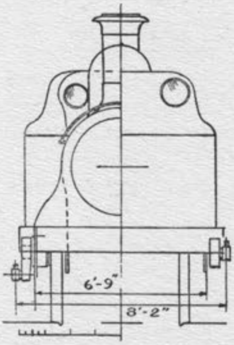


The outside crank of No. 145 *was painted black, edged with a fine red line as was the axle, too.*



A charming combination of Martley and Kirtley was old 145. *Note the sandbox.*

days—and the two headboards most commonly in use were the plain white and the white with two horizontal black bars. These little engines ran until 1890-91, when they were replaced by 0-6-0 tank engines of Kirtley's design. Thus a new No. 145 made her appearance in 1891, class " T " (the older engines were known as class " R "). The numbers of the newcomers ran from 141 to 150, and so good was the material put into them at Longhedge Works that one or two of them are with us even today. There was never a nicer looking shunting engine than the new No. 145, and the " T " class quickly became familiar to Londoners in the Victoria and Herne Hill districts. There *always* seemed to be one or two shunting about the carriage sheds outside Victoria station ; indeed, a visit to the famous old terminus was hardly complete without a glimpse of one or other of them ! Like all the Kirtley designs, one can fairly term them the orthodox locomotive, thoroughly typical of British practice in the early 'nineties. They had round-topped tanks, and a nice comfy cab, and were distinguished by a pleasing neatness of outline. When the



Interesting weather boards and wing smokebox front plate.

amalgamation with the S.E.R. took place their charming black livery gave place to a rather over-ornate colour scheme, but, worst of all, they lost their most elegant chimneys, which were replaced by short nondescript things of Ashford design. These two changes had a most drastic effect on their general appearance. At once, they became squat, over-wide, fat little engines, and gone for ever were the good looks of the L.C.D.R. engine. What a pity! Yet in fairness one must remember that much the same was probably said when Kirtley replaced the heterogeneous collection of copper-capped Martley funnels by his own finely-drawn one. All a matter of taste, you remark. Yes, true, but it is curious that some engines were equally suited with two designs. For example, the L.N.W. "Problem" class of single-wheelers looked equally well with either Ramsbottom or Webb chimneys, whereas we all remember what happened to *Gladstone* when her Stroudley masterpiece was replaced by the parallel-sided Marsh design!

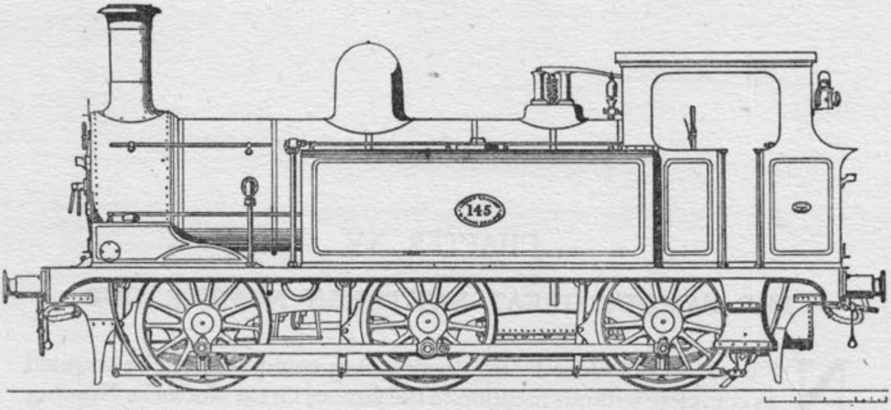
Useful Dimensions

"*R*" *Class. Old No.* 145.

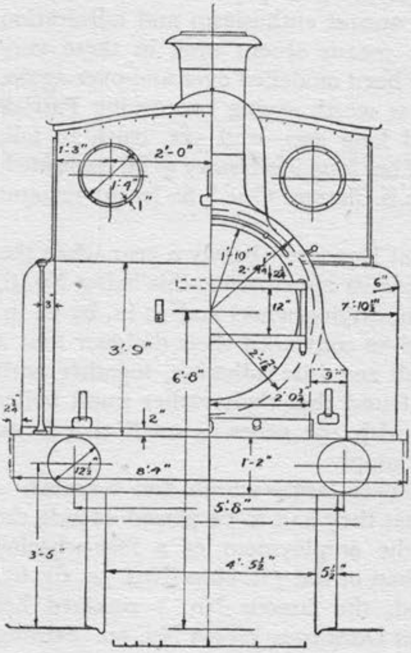
Cylinders	15 in. by 22 in.
Wheels	5 ft. 6 in. and 3 ft. 6 in.
Wheelbase	6 ft. 6 in. and 7 ft.
Boiler	9 ft. 9$\frac{1}{8}$ in.
Diameter	4 ft. 0$\frac{1}{2}$ in.
Boiler centre line	6 ft. 2 in.
Length of firebox casing	4 ft. 1$\frac{3}{8}$ in.
Depth of inside firebox below centre line	4 ft. 6 in.

"*T*" *Class. No.* 145.

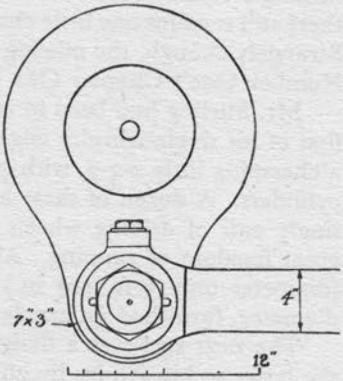
Cylinders	17 in. by 24 in.
Wheels	4 ft. 6 in.
Wheelbase	7 ft. 4 in. and 7 ft. 8 in.
Boiler barrel	10 ft. 0 in.
,, ,, diameter	4 ft. 0$\frac{1}{2}$ in.
Centre line of boiler	6 ft. 8 in.
Height of bunker	3 ft. 9 in.
Height of cab roof (inside)	7 ft. 0 in.
Leading overhang	5 ft. 0 in.
Trailing overhang	5 ft. 9 in.
Chimney (height)	3 ft. 6 in.
Chimney above rail	12 ft. 6$\frac{1}{4}$ in.
Dome cover (height)	2 ft. 6 in.
,, ,, (diameter)	2 ft. 2$\frac{3}{4}$ in



Side elevation showing the neat and trim outline of the second No. 145.


1'3"
2'-0"
1'4"
1"
1'10"
2'4¼"
2¼
12"
6"
7'10½"
3"
3'9"
6'8"
2'1⅞"
9"
2'0¼"
2¼
2"
12½
8'4"
1'-2"
5'8"
3'-5"
4'5½"
5½"

Shades of Victoria! There was something very "Chatham" about the position of the cab windows and the curiously end-curved roof.



Typical solid-eyed coupling-rod end as fitted to the second No. 145.

CHAPTER XV

THE FAMOUS GREAT NORTHERN NUMBER ONE

NO book on the older British locomotives could possibly be counted as complete without mention of the famous Great Northern Number One. This engine, together with William Dean's 7 ft. 8 in. single-wheeler, *Lord of the Isles*, was amongst the most popular iron steed ever placed on metals. Both evoked the utmost enthusiasm and admiration in their day—an admiration by no means absent even in these very modern times, and both engines have been modelled over and over again. One would imagine that all that was worth saying concerning Patrick Stirling's masterpiece had been said long ago—and yet, truth to tell, there still remains one little chapter of her long life-history to be recounted. Strangely enough, the missing section is Chapter One ! So let me recount Number One's Chapter One ! !

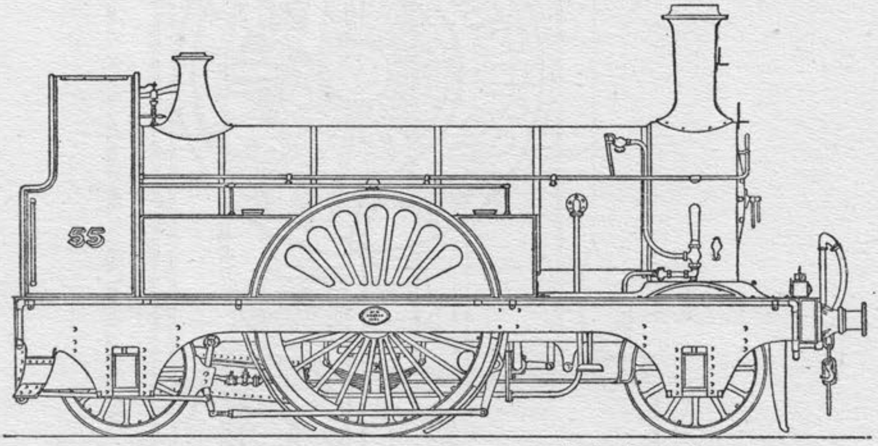
Mr. Stirling had been in control at Doncaster barely a year when the first of his single-wheeler engines made its appearance, this being No. 6, a charming little 2-2-2, with 7 ft. 1 in, driving wheel and 17 in. by 24 in. cylinders. A dozen of these locomotives convinced their designer that a single pair of driving wheels gave all requisite adhesion, together with great freedom of running. Also he found that their rather small boiler (diameter only 3 ft. 10½ in.) fitted with 192 tubes as small as 1 $\frac{9}{16}$ in. diameter, furnished an ample steam supply.

The next step was a design with even larger wheels and cylinders—the latter so big (18 in. by 28 in.) that they had to be placed outside the frames, this in turn necessitating the employment of a four-wheeled bogie. Hence, while the last half-dozen of the 7 ft. class (Nos. 55, 61, 63, 215, 37, 39) were being completed, the famous No. 1 received her finishing touch, appearing in 1870 as Doncaster Works No. 50. Stirling was a big cylinder, small boiler man, and it is therefore hardly surprising to find the same diameter, both of barrel and tubes, together with the short 5 ft. 6 in. firebox, included in the new design. So many loco-modellers are familiar with the outlines of No. 1 after her rebuild in 1880, when she was brought in line with later engines of her class, by being given the longer 6 ft. 2 in. firebox, larger 4 ft. 7½ in. trailing wheels, and longer main frames, that her original appearance may strike them as quite unusual. Nevertheless, she would make a lovely little model, and one, moreover, of great historical interest. Is it too much to hope that my drawings of her may inspire some lover of Stirling engines to set about this project with enthusiasm?

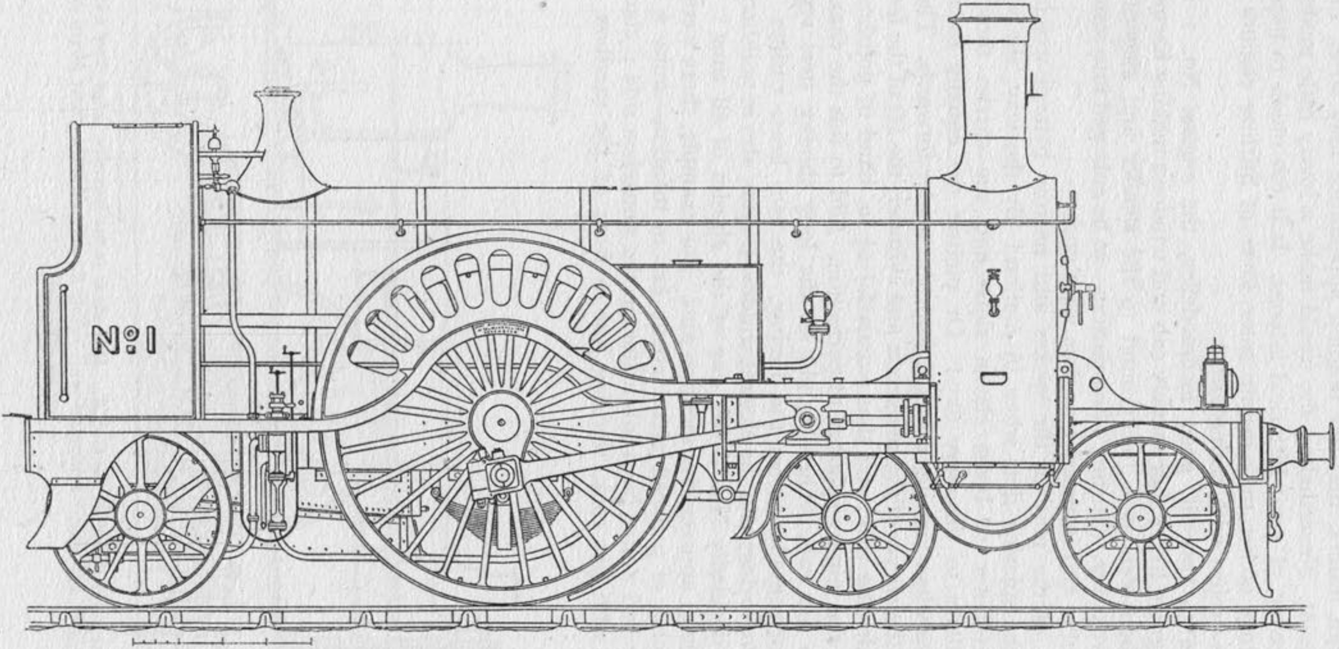
Picture to yourself, good locomodeller, the *original* No. 1 in her beautiful green livery, her shapely cab and windows making harmonious curves when seen as a background to the slender and elegant brass safety-valve cover. (Stirling's first pattern—to be enlarged into something more massive and impressive as time went on.)

Think of the play of the spokes and narrow balance-weight seen through the splasher-slots when in motion! By the way, she was the only eight-footer to boast eleven slots—and she carries those same splasher-plates to this very day! Or picture the equally fascinating perspective when viewing a model from the tender forwards. Then one could see the curves of the smokebox and cylinder, the lift of the footplate over the driving axle, and that wonderful 2½ in. band of polished brass crowning the mighty splasher to perfection. Add to this the charm of a peep into her cab. There would be the long shining steel regulator placed horizontally across the firebox, the two brass casings to the safety-valve springs and the elegant window frames, also in polished brass.

Oh! decidedly No. 1 was one of the classics of all time! Other features claim appreciative mention also. For example, there were many more touches of polished metal about her to mention—quite a list, in fact. She had a nice bowl lubricator on the smokebox side; clack-box, complete with pet cock, showing just in front of the sandbox, bright



Stirling's first 2-2-2 design for the G.N.R. Here she is in her later days when fitted with the big safety-valve casing and other "modernisations." Note the vacuum brake ejector placed at the side of the smokebox.



No. I *when brand new. She then had a* 5 *ft.* 6 *in. firebox and small* 4 *ft.* I *in. trailing wheel. A very lovely engine indeed.*

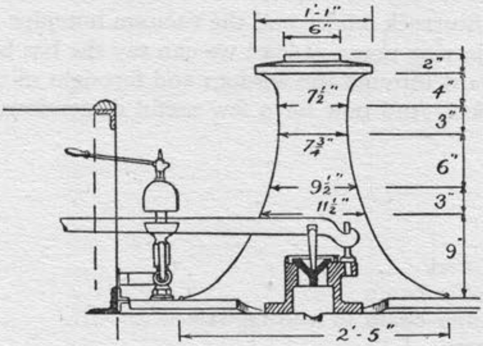
copper injector steam pipes, the left-hand one of which passed down in front of the steel reversing-rod. Nearby was the sand valve-rod, and two brass injector wheels with their little knob handles. In later engines the space between the splasher and cab was occupied by a long box and these features were no longer visible.

Below the footplate could be seen the vertical-form injector protected by its semi-circular shield, the edge of which carried a fine brass beading. The massive big-end, connecting-rod and crosshead, cottered to its 2⅞ in. piston-rod, were all gleaming features, not to mention the 1¾ in. brass beading that ornamented the outer edge of the bogie-wheel splasher, the long steel smokebox door-hinges, handles and knob door-handle, whilst the smokebox handrail support was another fitting in polished brass. Viewed from the front the bright cylinder covers and the big early-pattern headlamp were also most attractive, but stay—I think by now I have mentioned enough to fan up the flames to model-making heat!

And isn't it nice to think that this famous engine is still in existence?—although it must be confessed that the would-be historians have effected such changes in her, the total effect of which amounts to the strange result of putting her into a condition which is really neither old nor new, and which does not truthfully represent her at any period of her working days! Still, we must not be ungrateful for their efforts. Would that both *Lord of the Isles* had been preserved to us for ever! And even if the odd Sturrock tender and the vacuum hosepipe and the hybrid chimney strike jarring notes, at least we can say she has been saved from the scrapping yard through the wisdom and foresight of the good folk of Doncaster Works! And now for a few useful dimensions of the original No. 1.

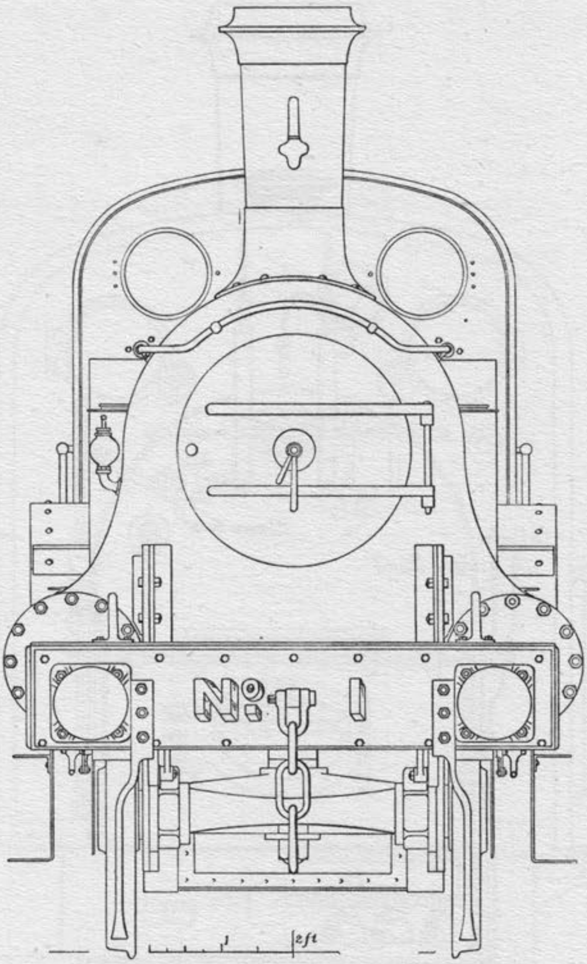
Wheels	8 ft. 1 in.
Bogie	3 ft. 11 in.
Trailing	4 ft. 1 in.
Lengths: buffers	1 ft. 6 in.
,, buffer-beam	6 in.
,, buffer-beam to leading axle	2 ft. 2 in.
Bogie wheelbase	6 ft. 6 in.
Rear bogie wheel to driving wheel	7 ft. 9 in.
Driving to rear axle	8 ft. 0 in.
Rear axle to rear buffer-beam	2 ft. 6 in.
Connecting-rod	6 ft. 11 in. between centres
Height of footplate above rails, front and rear	4 ft. 4 in. and 4 ft. 2 in.
Over second axle	4 ft. 11 in.
Radius of footplate above driving axle	2 ft. 3½ in.
Radius of splasher	4 ft. 3½ in.
Depth of outside frame	3½ in.
Distance of slide-bars apart	1 ft. 0 in.
Radius of smokebox	2 ft. 4⅝ in.

Radius of boiler lagging	2 ft.	2 in.
Outside length of smokebox	2 ft.	9¾ in.
Height of cab	6 ft.	6 in.
Width of cab	6 ft.	0 in.
Centres of windows	3 ft.	8 in.
Centres of windows above footplate	5 ft.	4 in.
Diameter of glass	1 ft.	0 in.
Smokebox door diameter	3 ft.	4 in.
Distance between safety-valve columns		11 in.
Handrail above footplate	4 ft.	4 in.
Cylinders (apart)	6 ft.	2 in.
Valve spindles (apart)	2 ft.	10 in.
Distance between main frames	4 ft.	0½ in.
Width over footplate	7 ft.	5 in.
Frames (thick)		1¼ in.
Width of splashers		8½ in.
Height of chimney	3 ft.	10⅛ in.
Chimney diameters : top (inside)	1 ft.	6 in.
,, ,, bottom	1 ft.	3 in.
,, ,, over rim	1 ft.	11 in.
,, ,, above rail	13 ft.	4 in.
Centre line of boiler above rail	7 ft.	1 in.
Width over splashers	5 ft.	9 in.

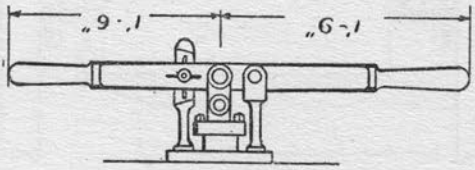


The first form of safety-valve, brass cover and whistle, as fitted originally to No. 1. *Compare this with the later pattern on page* 102.

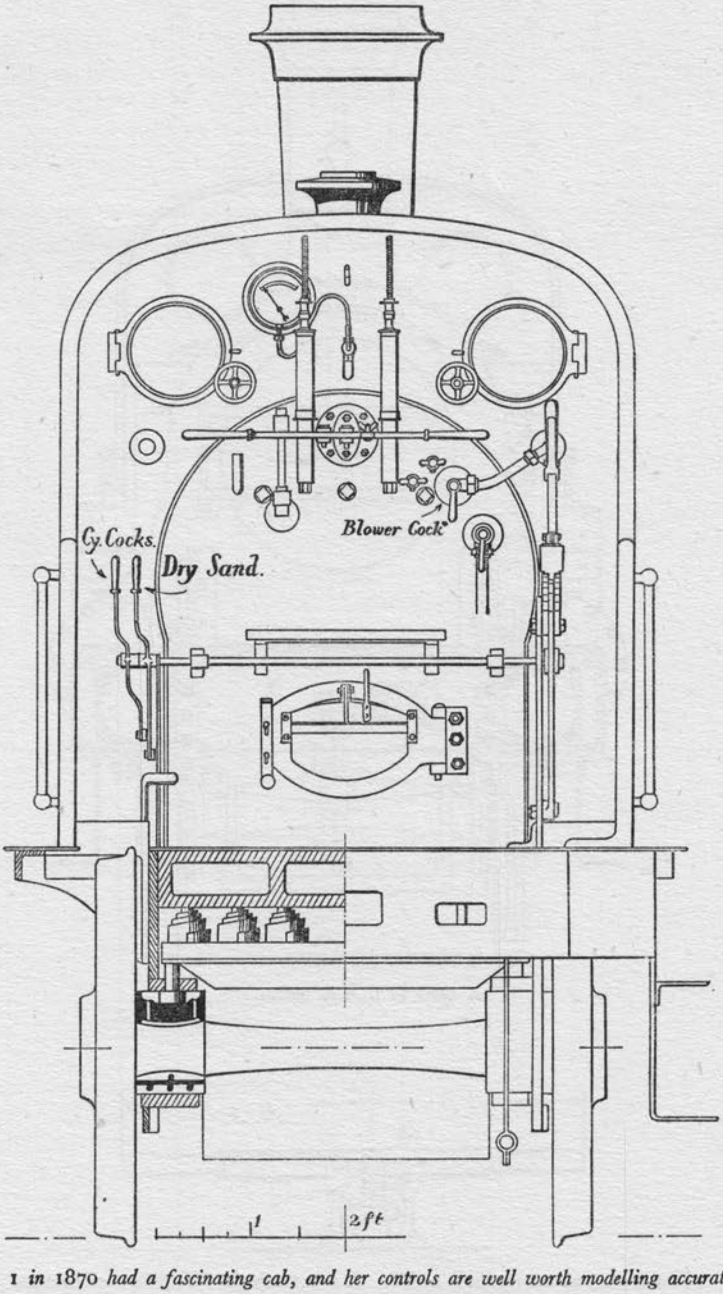
It is now many years since one could stroll on to the familiar arrival platform at Kings Cross and watch a stately "eight-footer" slowly drawing up at the head of a G.N.R. express train. Very majestic one of these engines then appeared, her great shining connecting-rod still gently swinging up and down ; a movement which somehow or other brought to one's mind the opposite kind of picture, when at high speed and far away in the level country, the same rod had been flashing its way



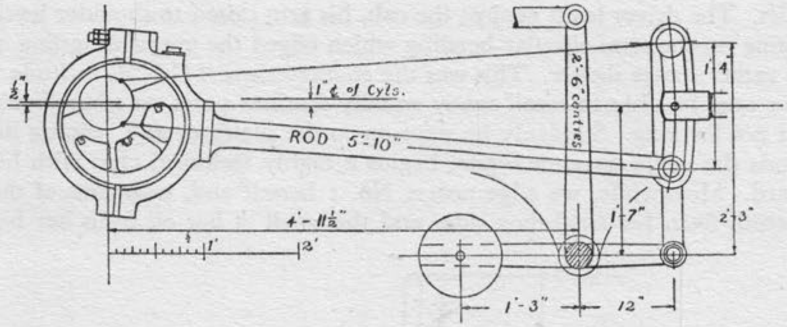
A study in G.N.R. curves.



Plan of the pull-out regulator handle. It was handy for both driver and fireman.

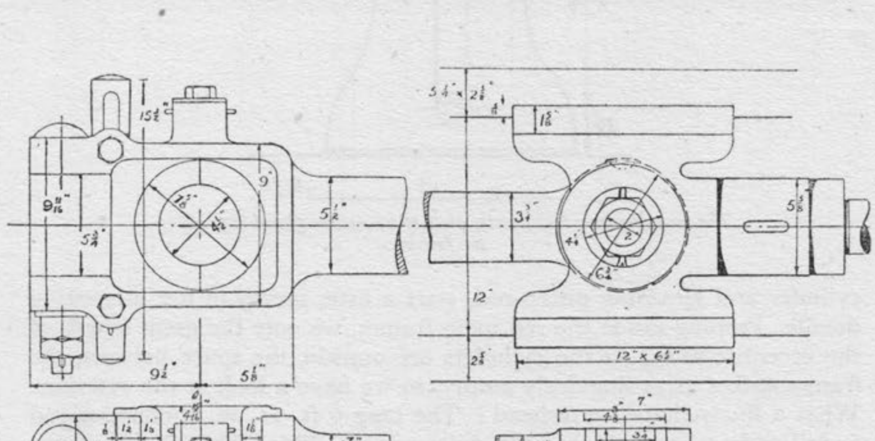

Blower Cock
Cy. Cocks.
Dry Sand.
1
2ft

No. 1 *in* 1870 *had a fascinating cab, and her controls are well worth modelling accurately.*



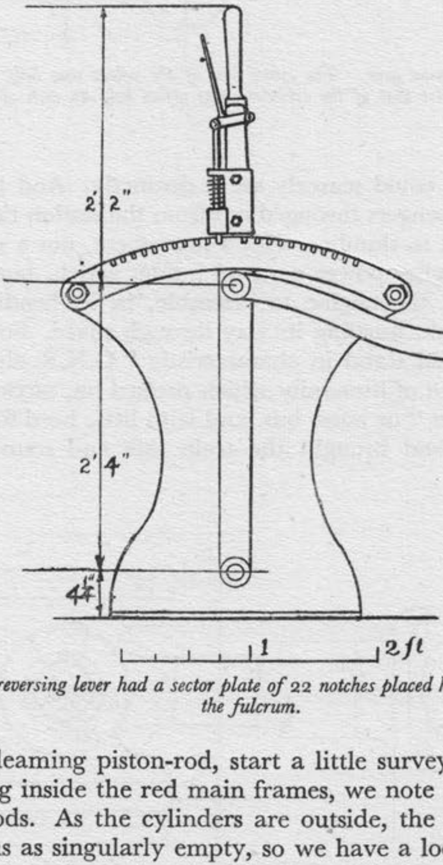
Original layout of Stephenson gear. The centre line of the valves was half an inch below axle centre, whilst that of the cylinders was offset half an inch above.

so fast that the eye could scarcely see it distinctly. And now all was at rest. While the passengers thronged out from the station the great engine itself seemed almost to slumber. Not a movement, not a sound, nothing to indicate that mighty power pent up inside, which, but a short while before, had caused the engine to resemble, in its headlong career, a veritable thunderbolt, hurtling its way through space. For a moment or two the driver would stand in characteristic " G.N.R.-single " attitude regarding the stream of humanity which pressed on, anxiously intent on catching a " growler " or horse bus, and with little heed for the beautiful locomotive which had brought the train safe and sound those many

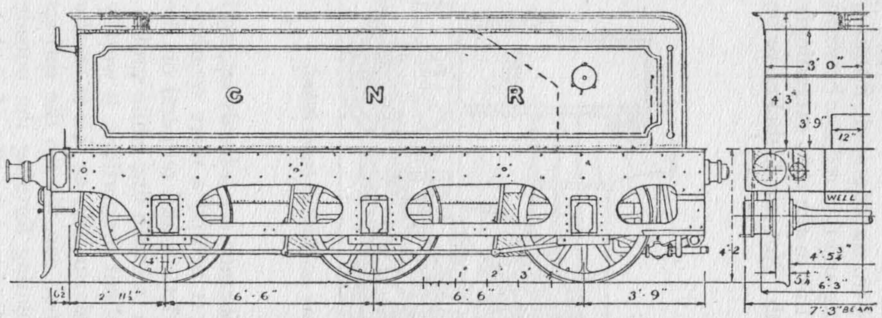


The jawed big-end, cross-head, and small end of the connecting-rod were well designed and remarkably like those of modern G.W.R. engines.

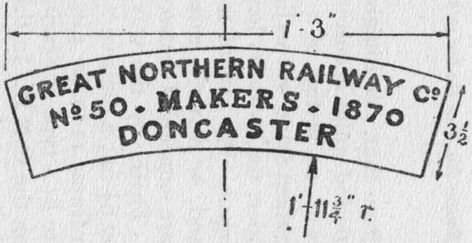
miles. The driver leant against the cab, his arm raised to shoulder level, resting on the semi-circular beading which edged the graceful outline of his rather sparse shelter. This was the characteristic " G.N.R. attitude " (you may be able to recall many equally familiar poses on other lines). But not for long. Suddenly he steps on to the platform and, wiping his hands the while on some waste, begins a highly technical chat with his guard. Meanwhile, we edge nearer No. 1 herself and, conscious of the warmth from her smokebox sides and the smell of hot oil from her big cylinder and gleaming piston-rod, start a little survey of her interesting details. Peeping inside the red main frames, we note the great length of the eccentric-rods. As the cylinders are outside, the space between the frames strikes us as singularly empty, so we have a look at the exteriors. What a finely-shaped crosshead ! The long 6 ft. 11. in. connecting-rod is delicately tapered, its big-end quite a large affair. The oil-cup on top catches our eye. Square in plan, the brass lid which screws into it and is retained in position by a taper pin, is also square in shape. Rather unusual this. The hexagonal nut cast on top has a circular hole drilled



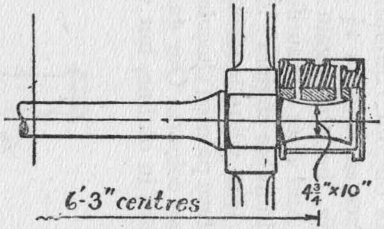
The reversing lever had a sector plate of 22 notches placed high above the fulcrum.


G N R
3' 0"
4' 3"
3' 9"
12"
WELL
4' 2
4' 5¾"
3¼
6' 3"
7' 3" BEAM
6½
2' 11½"
6' - 6"
6' 6"
3' - 9"
4' 1"
1'
2'
3'

No. 1's *first tender was a solidly built affair, and matched her engine nicely.*

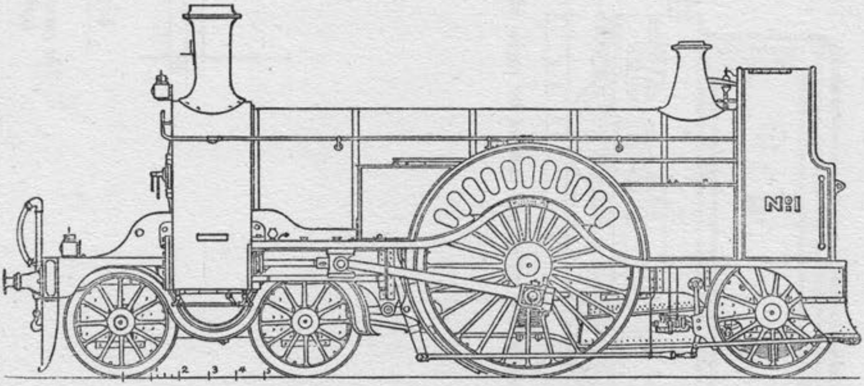

1' 3"
GREAT NORTHERN RAILWAY Cº
Nº 50 . MAKERS . 1870
DONCASTER
3½
1' 11¾" r.

White painted letters on a black ground made an attractive works' plate which was attached to the angle-frame of the footplating.

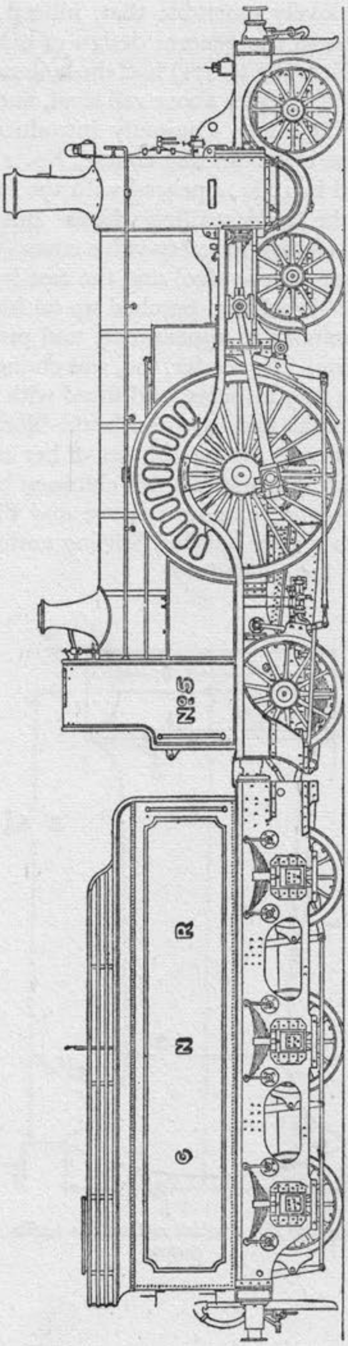

6'-3" centres
4¾"×10"

The curved journal of the tender axle was a typical Stirling feature of design.

through it, for the reception of lubricating oil, and is closed by a ball-headed plug, kept tightly upwards by a spiral spring surrounding the interior oil-pipe. Strolling towards the rear, we pass the great splasher, ornamented with its 2½ in. brass band encircling a thin painted black margin, the latter again separated from the green paint by a fine white line. And what a beautiful grass-green it was with which Stirling adorned his admirable engines! Below the huge splasher comes the works' plate, black with white lettering, attached to the 3½ in. outside angle-framing, in its turn painted chocolate, with a black edging and thin red line between the two colours. Our gaze turns beyond all this to the cab, exceedingly pleasant in outline, but very shallow in depth. Not much shelter to be gained from that, one imagines. But the enginemen are a hardy set, and at this period quite accustomed to roughing it behind a mere weather-board, with no vestige of a roof! The gilt letters and numeral on the cab side-sheet stand out well, being shaded in red with fine white strokes. The tender, too, with its long sides and excellent proportions, is worthy of its engine. We cannot see the gleaming alarm bell, as this is on the right-hand, or driver's, side of the tender, nor can we see the springs which are concealed between the double plating forming the outside frames. These, by the way, are separated by great baulks of timber, 11 in. by 6¼ in., a massive " sandwich " frame indeed—to say nothing of an inner frame 11 in. by 4 in. as well! The outside axleboxes have curved brasses to fit a type of bearing much favoured by Stirling during his long career on the G.N.R. In this particular design the journal has no collar to check lateral thrusts, the concavity of the bearing surface providing the necessary guidance. And with this we regretfully finish our little

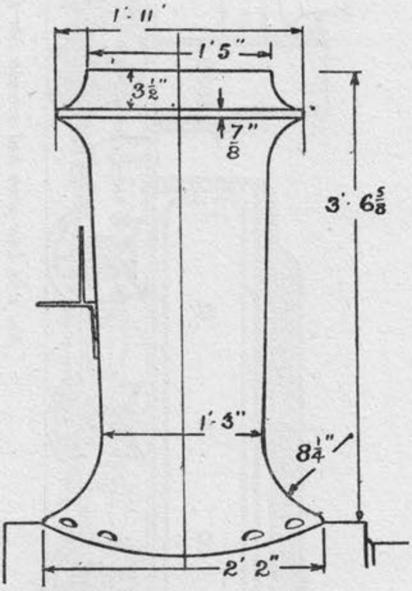


The famous No. 1 *as she ran in her later years, a handsome and familiar engine indeed.*



No. 1 in later years had a tender like that of the rebuilt No. 5.

tour of inspection. A lovely ensemble that, indeed. In all, 37 engines were built, more or less to the general design of our famous No. 1, but the last eight of these (Nos. 664 to 671) had the boilers pitched higher, with the centre-line standing 7 ft. 3½ in. above rail level, and also with 4 ft. 7½ in. trailing wheels, which had been originally introduced on No. 544, the eighteenth engine of the class. In due course, No. 1 herself received the later modifications, and in 1880 appeared with the longer trailing wheelbase of 8 ft. 8 in. and the larger trailing wheels. But what struck the eye most, perhaps, was the change in safety-valve cover (this was necessitated by the new Ramsbottom safety-valve) and the cast-iron smooth chimney, with its " special train " headlamp perched up on high ! My drawing of No. 1 shows these alterations in appearance, and presents her as she ran for years on the main line. Her tender, too, was changed for one of similar type, but with higher 4 ft. 9 in. sides, and fitted with three coal rails, and also with the vacuum brake and cast-iron brake-blocks. One hesitates to make a final choice between the two phases of her existence. Both have their charms, the earlier one with its tall chimney bearing the sprightly form of youth ; the second, a more mature and dignified engine, and oh ! so very familiar to a later band of Stirling enthusiasts. Now, which would you chose, good locomodeller ?



Cast-iron chimney of No. 1 which replaced the earlier " built-up " pattern.

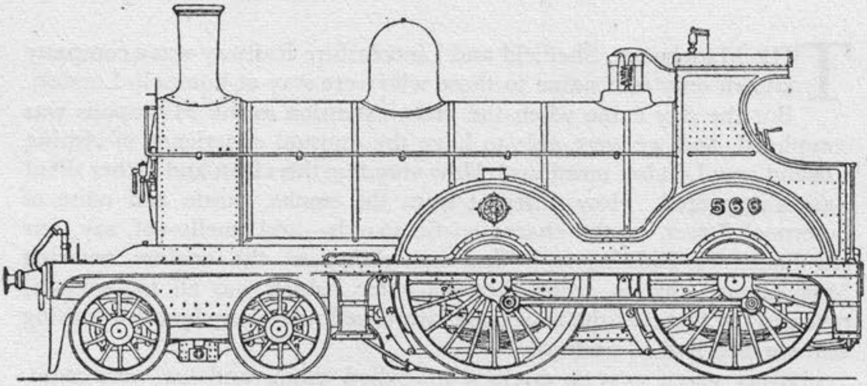
CHAPTER XVI

M.S. & L. RAILWAY, No. 694

THE Manchester, Sheffield and Lincolnshire Railway was a company known only as a name to those who were stay-at-homes in London. But the day came when the great extension to the Metropolis was completed, and we were able to have the unusual experience of visiting a brand new London terminus! How very fine this clean and rather silent station appeared. How different from the smoke, bustle and noise of Liverpool Street, or the characteristic sounds—and smells—of, say, our old haunt of Paddington! But one glance at the engines entering Marylebone—that is, when they *did* enter (which was all too seldom) revealed the fact that the newcomers were well worth any hours of waiting that we had had to undergo.

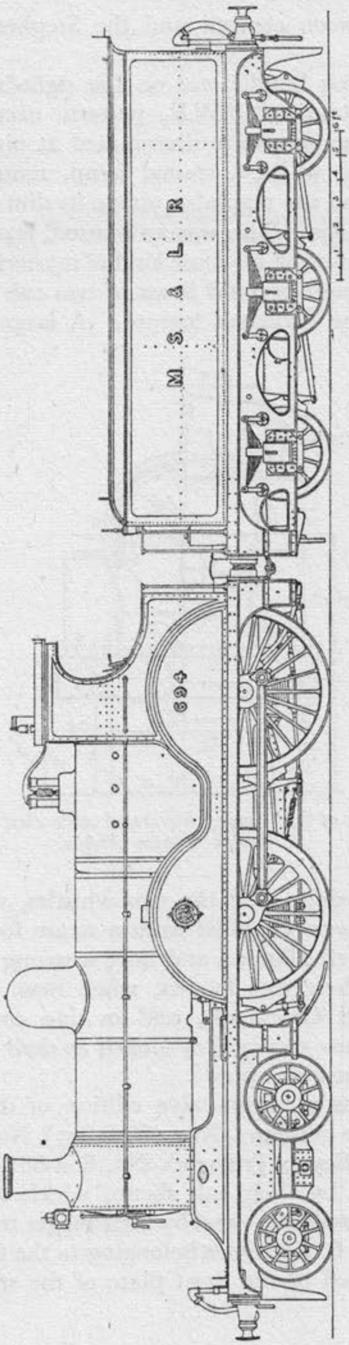
Lovely green express engines we called them, and we were right. They were lovely green engines. As first acquaintance developed into deeper friendship we became aware that there were at least three classes, although at first sight they closely resembled each other. Presently we were able to photograph each type, and also to sort out their numbers. The smallest lot comprised thirty-one engines Nos. 562-567 (built in 1890), Nos. 682-686 (built in 1891), Nos. 687 (1892), Nos. 688-693 (1894) and Nos. 700-711 (1892). They were all built at the company's works at Gorton, excepting Nos. 700-711. These had been constructed by Messrs. Kitson, who had also turned out the very first one, No. 561, in readiness for the Manchester Exhibition of 1887, being shown there as a joint Kitson-M.S.L.R. exhibit. In a few unimportant details she differed from No. 562, which appeared three years later. The chief at Gorton at this period was the able Thomas Parker, who had succeeded Mr. Sacre, of single-wheeler fame. The design was a typical English 4-4-0 of the day, neat and efficient, and a delight to the eye. It strongly recalled such pleasant engines as the early Aspinall L. & Y.'s and the William Kirtley black beauties of the London, Chatham and Dover line. They had cylinders 18 in. by 26 in., wheels 6 ft. 9 in. and 3 ft. 6 in. spread over a wheelbase of 21 ft. 9 in., 5 ft. 9 in. (bogie), 8 ft. 7 in. (driver's). The boiler was 10 ft. 8 in. long, with a mean diameter inside of 4 ft. 2 in. pitched with its centre-line

7 ft. 4½ in. above the rails. The grate area was 18.85 sq. ft., pressure 160 lb., and they turned the scale at 46 tons. When new, the exhibition engine had had bright tyres, a brass beading to the splashers and a number-plate not unlike the Drummond L.S.W.R. pattern, with black waxed figures. Nice as these engines were, we found a larger edition of them yet more attractive. These proved to be six engines built in 1895, although they had been planned two years earlier by Mr. Parker. However, he had retired from his post in December, 1893, and his successor, Mr. Harry Pollitt, introduced into Nos. 694-699 some touches of his own. For one thing, he raised up the boiler until it stood no less than 7 ft. 11 in. above rail level, which was high indeed for those days. It gave the engines a wonderful appearance, which was enhanced by the position of the chimney, which was placed 3 in. in advance of the centre of the bogie.



The M.S. & L. Ry. Parker engines were most pleasing in proportions and typical of their day.

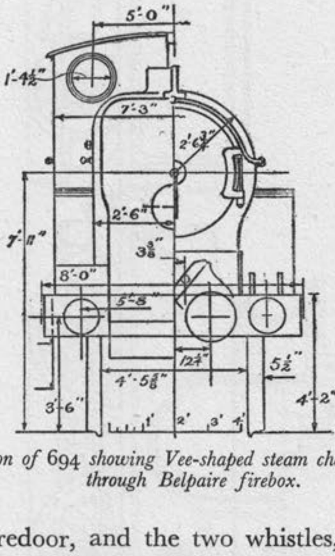
The colour scheme was also most attractive : a fine middle-green, edged with a black border and separated from it by a fine yellow line, whilst the black headlamps had quaint little side panels of yellow. The frames, footsteps, guard-irons and buffer-sockets were light brown, edged with yellow lines, the numerals and initials being gilt shaded with red. The brass bands around the splashers, bright tyres and the chimney, with wide sweeping base and triple moulding at the top, supplied the finishing touches. What a harmonious picture! Turning from good looks to interesting technical features, it is worth recording that they were the first express engines to carry a Belpaire firebox and that the slide-valves, inclined at 1 in 10 worked on V faces, much as in the L.N.W.R. "Precedent" class. The cranks were hooped, elliptical in outline and provided with a bolt passing through the crank-pin. The connecting-rods



No. 694 was a fine looking engine indeed and the first express locomotive to carry a Belpaire firebox.

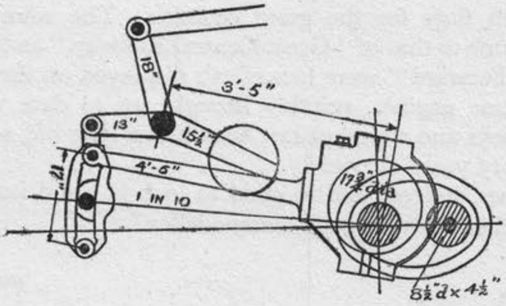
were 6 ft. 6 in. between centres, and the Stephenson gear was quite solidly planned.

The screw reversing handle was on the right-hand side of the cab and resembled the Adams L.S.W.R. pattern, except that it had two handles. Two water-gauges were illuminated at night by a small lamp placed between them, whilst a second lamp, mounted on a tall iron situated directly behind the regulator, shone its dim rays on to the steam and vacuum-brake gauges. This was an unusual feature, and just at first we mistook this tall lampiron for some kind of mysterious second regulator handle! Not many engines could boast of two cab lamps; Stroudley's *Gladstone* had the same luxurious feature. A large curved rectangular shield covered the firedoor, and the two whistles, vacuum ejector and sight-feed lubricators were supplied from a steam fountain. The layout of the cab was very well planned and bore a strong resemblance to the L.S.W.R. engines. These fine fellows, when new, ran the best trains between Sheffield and Grantham, and in due course were frequent visitors to London. How stately they looked as their 7 ft. driving wheels went swinging round at high speed!



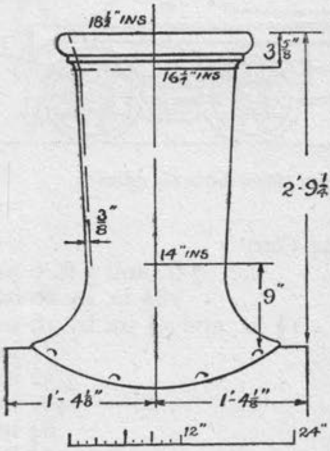
Front elevation of 694 *showing Vee-shaped steam chest and section through Belpaire firebox.*

The third type was a piston-valve edition of these grand engines. There were thirty-three of them: Nos. 268 (1897), Nos. 269-270 and Nos. 852-861 (1898) and Beyer, Peacock's No. 862-881, also built in 1898. One could spot them by their cab sheets, which were built higher—indeed level with the handrails—and by their bigger tenders with 4 ft. 3 in. wheels as against the 3 ft. 9 in. ones belonging to the 694 class. They also had lubricators attached to the front plate of the smokebox—a feature

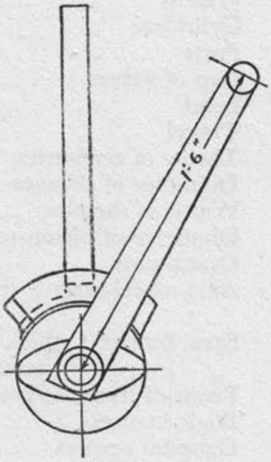

18"
3'-5"
13"
15½"
12"
4'-6"
1 IN 10
17¾" dia
8½" d × 4½"

General layout of Stephenson valve-gear on 694.

shared by the 561's, and later on by the big single-wheeler 967 class, but not by the 694 class. These piston-valve engines had the honour of running the first trains at the opening ceremony of the London extension on March 9th, 1899, and thus Nos. 861, 268, 269 and 270 were specially


18½" INS
3⅝"
16¼" INS
2'-9¼"
⅜"
14" INS
9"
1'-4⅛"
1'-4⅛"
12"
24"

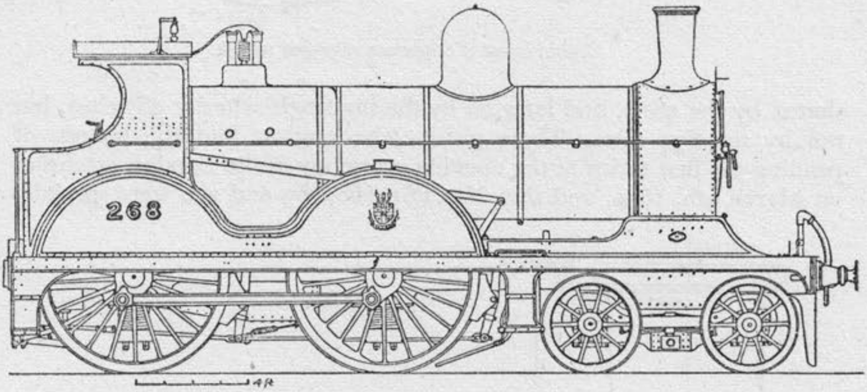
The Parker chimney was a heavy casting with a sharp taper at the extreme top.



Regulator handle, gland and lamp-iron of the 694 *class.*

decorated with flags for the great occasion. The company had now changed its name to that of "Great Central Railway," and the new shield and motto "Forward" were henceforth displayed on the driving-wheel splashers. These engines, suitably brought up to date with Robinson boilers, chimneys and superheaters, have had a long life, some putting in more than forty years' service!

Fine engines, indeed, and so good to look at—and isn't that enough to commend them to you, good locomodeller?



These splendid Pollitt engines had 8 in. piston valves placed below the cylinders.

Principal Dimensions of the M.S.L. Railway 694 *Class*

Wheels	7 ft. and 3 ft. 6 in.
Cylinders	18½ in. by 26 in.
Ports	1½ in. and 3¼ in. by 16 in.
Lap of valves	1 in.
Lead	5/32 in.
Travel	4 3/16 in.
Throw of eccentrics	6½ in.
Diameter of sheaves	17¾ in.
Width of sheaves	2⅝ in.
Diameter of piston-rods	3⅝ in.
Crank-pins	8½ in. by 4½ in.
Axle wheel-seats : diameter	6½ in. and 8¾ in. by 6 3/16 in. and 7 3/16 in.
Steel frames : thick	1 1/16 in.
” ” between	3 ft. 11½ in.
Front of frame to centre of bogie	5 ft. 3½ in.
Bogie centres	5 ft. 9 in.
Coupled centres	9 ft. 0 in.
Total wheelbase	22 ft. 2 in.
Engine and tender wheelbase	44 ft. 5 in.

Length over buffers	53 ft. 7¾ in.
Throw of coupling-rods	11 in. apart 6 ft. 2½ in.
Boiler clothing	4 ft. 9⅞ in. dia.
Length of barrel	11 ft. 0½ in.
Length of Belpaire firebox	6 ft. 4 in.
Pressure	170 lb.
Wheelbase of tender	13 ft. 0 in.
Widths (outside of firebox), top	4 ft. 6¼ in.
" " " bottom	4 ft. 1 in.
Blast-pipe	4⅞ in.
Total weight of engine and tender	82 tons 2 cwt.

CHAPTER XVII

TWO CHARMING SHUNTING TANK ENGINES

JOHN CRAVEN was a scintillating engineer. From his lively imagination locomotive designs flew as freely as sparks from the anvil! When he resigned from his post at Brighton, after a little over 20 years' service, the L.B. & S.C. Railway found themselves the proud possessors of no fewer than 72 classes of engines!

Somehow, I always picture the pattern-makers down at the works. During those far-off heroic days I see them dashing wildly about with plane and chisel in one hand, and in the other a fresh detail-drawing hot from the office. Yet another pattern to be skilfully pieced together! Would there ever be an end to them?

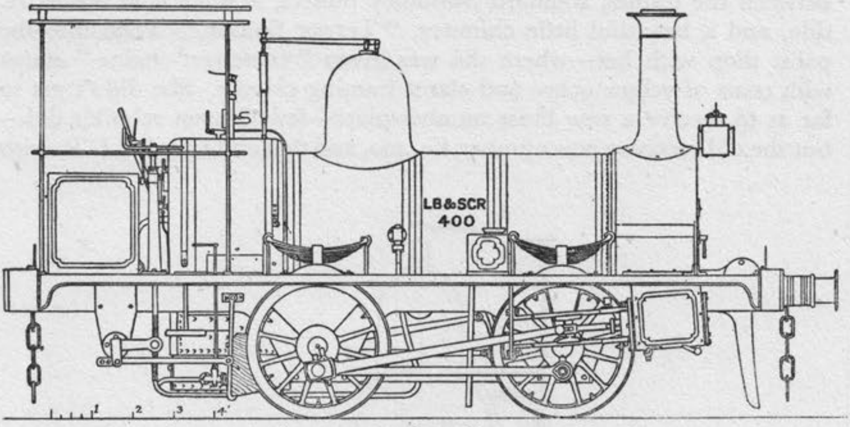
For we must have patterns for castings, as any modelmaker knows full well—and what a lot of these lovely black shiny things are needed in the case of a real locomotive. When Craven was in good form and steaming freely, he was quite equal to seven or eight new types of engine in a twelve-month!

Furthermore, nothing, in his view, must at all resemble anything else that had gone before, and every conceivable sort of scheme for frames, wheels, valves, pumps, and other details poured out in full flood. A busy scene indeed.

Incidentally, such goings-on must have created a regular boy's paradise—that steep hill over which the youthful enthusiast could peep down in wonder on the ever-growing stream of new engines below—each novel in shape. No one knew what might come next—the designer himself didn't—and, after a fill of this entrancing nature, the boy with the same eye for a bit of beautiful craftsmanship could slip down to the beach and gaze at the lovely fishing boats drawn up high and dry, those luggers which R. H. Nibbs and other fine old water-colourists of their day sketched so sensitively, pictures which are now the pride of the Corporation gallery. Yes, indeed, it must have been fun to be living in Brighton.

At this time it so happened that an engine was needed to haul the three-coach express between Polegate and Hailsham, a trip of 2 miles 76 chains. " Something small," thought Mr. C., " why not then a four-wheeler ?—I haven't done one before, and, by Jove, it shall be a saddle-tank ; and I'll try chilled-iron solid wheels with cross-section spokes ! " Accordingly, early in the year 1868, No. 27 appeared. It was then only April, but already two other new types had appeared since Christmas !

Sometimes Craven's engines were passably good in outline, oft-times they were not so good. No. 27 was not so good, but she had one redeeming feature. Being a four-wheeler with outside cylinders, she belonged to the " Noble Order of Contractor's Engines." Now, contractor's engines are usually very jolly indeed, the movement of the coupling-rod behind the connecting-rod giving them much charm. And in general they are usually so tiny that as they toddle along they create the same fascination that a pretty little child does with its innocent gambols.



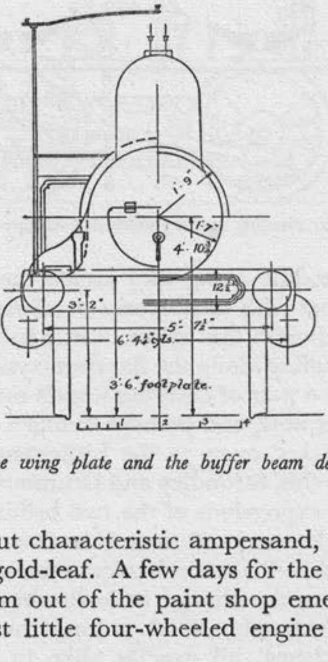
An attractive shunting engine painted in passenger livery !

But all was not well with this infant. Little baby 27 lurched about all over the show when puffing along the flat countryside, so she was returned to Brighton to receive a pair of carrying wheels under the footplate. She looked uglier than ever now, and perhaps feeling a change of air would be beneficial, she was packed away to the Littlehampton branch.

Two years after all this, Stroudley and Drummond arrived at Brighton. One can imagine the expressions of the two brilliant young engineers as they proceeded to take stock of their inheritance—" Och, mon !—it's noo a locomotive works—it's a mechanical museum ! " mutters Dugald. Soon, surprisingly soon, the change in leadership could be noticed. In the paint shop, for example, stood a long row of 0-4-2 tanks (" D tanks," they called them), all exactly alike in design, in detail and precision of workmanship. These new engines, painted a novel shade of yellow ochre, with sturdy chimneys surmounted by glittering copper-cap (dear me, and all *exactly* alike too), foretold the close of the erratic,

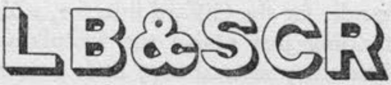
" what comes next ? " era. The day of mass production had dawned at Brighton !

Stroudley needed a works-shunter to marshal these newcomers around the works, and to pull a Craven corpse or two out of the way occasionally. She would have to have a short wheelbase—works lines always abound in sharp curves. Was there anything suitable amongst the tropical tangle iron at Brighton ? Ah ! fetch in No. 27 from Littlehampton. Yes, she would do. Out came all six wheels, off came the saddle-tank, coal boxes, cab roof, ugly little stove-pipe chimney, buffers and half the brake-gear. Now for reconstruction. Four new driving wheels, a well-tank placed between the frames, standard Stroudley buffers, a small coal box R.H. side, and a beautiful little chimney, " Terrier fashion." Then into the paint shop with her—where she was given " passenger-engine " status with coats of yellow ochre and claret framing colours. She didn't get so far as to receive a new brass number-plate—few Craven rebuilds did—but she did receive a new number, i.e. 400, and that and L.B. & S.C.R. with its strangely-shaped but characteristic ampersand, were blazoned on the boiler sides in purest gold-leaf. A few days for the decoration to harden, and then, behold, from out of the paint shop emerged a dainty golden butterfly—the sweetest little four-wheeled engine one could ever wish to see.



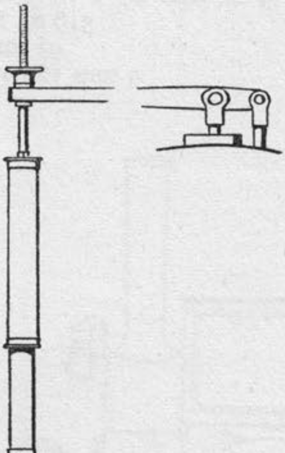
Note the wing plate and the buffer beam decoration.

Let us have a closer look at her. The first thing that strikes us is the curve of the front wing-plate of the smokebox. This gives the front of our little engine a graceful " settled-down " appearance. Above the two

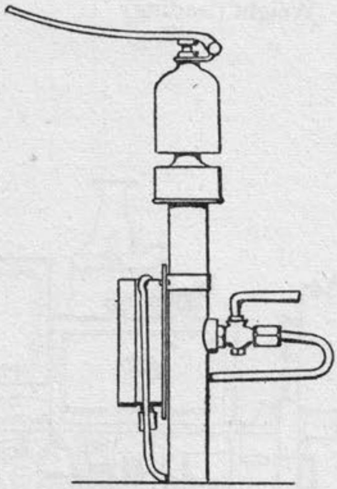


This handsome 3 in. gilt lettering made a brave show on the boiler of No. 400.

diminutive splashers which are bolted down to the footplate, stand the springs. These are held by curved-headed hangers of the form invented by Ramsbottom (quite a number of his ideas, incidentally, seem to have been adopted by Craven). The little sandbox, with its tiny panel of yellow, 6½ in. square, has the standard Stroudley circular lid—a simple design but, like so many of his details, "just right." The support for the canvas roof (there is no weatherboard at all) consists of the four vertical steel pillars holding three horizontal roof-rods, and at the 3 ft. level, a continuous rail runs round the sides and back. Notice the absence of boiler handrail. The couple of spring balances are held, at their lower end, by a common U-shaped bracket attached to the raised firebox, whilst the whistle steampipe also serves as a bracket for the pressure-gauge. Immediately behind this, and within convenient reach, can be seen the



The two safety-valves were attached at their lower ends to a V-shaped bracket.



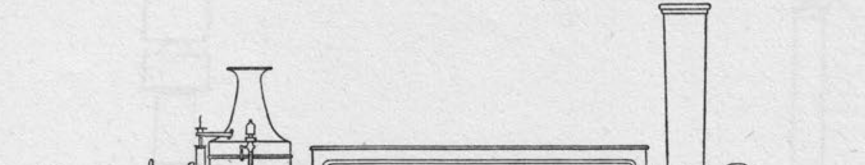
An early form of steam fountain. The whistle handle was quite an artistic affair! The pressure gauge was held in a very convenient position.

blower valve. The handle for the Giffard injector, which No. 400 carried, can also be seen standing just above the footplate. Beyond the new 3 ft. 5½ in. wheels, Stroudley altered very little below footplate level. A couple of leading guard-irons, and his buffers constituted the changes, and, of course, the well feed-tank. There is no rod connection for sanding gear, nor for the cylinder cocks, and if you want to clear any condensed water out of the cylinders, the only way is to jolly well jump down, open the cocks, and run alongside until all is well! But that, after all, is not of much account in a works locomotive!

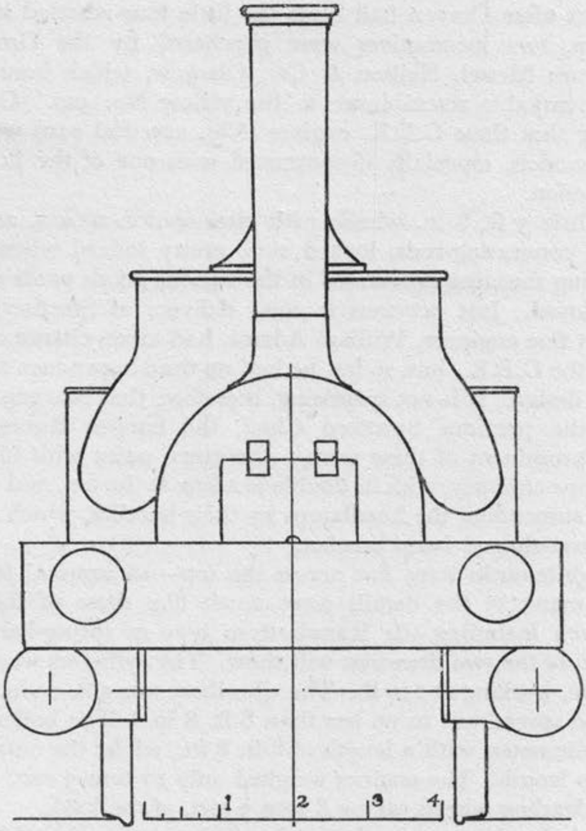
By 1879 heavier engines were being built at Brighton, and little 400 was sent off to Redhill goods yard in March. Her days of usefulness in the works had come to an end. However, she lasted till 1896, when she was scrapped at Horley, and the little "Contractor" type engine vanished for ever from the L.B. & S.C. Railway.

Useful Dimensions of No. 400.

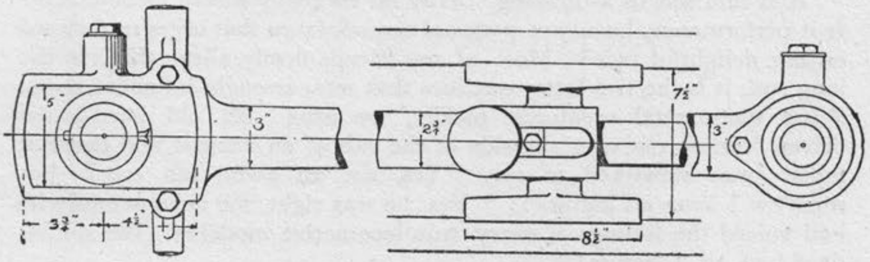
Cylinders	9 in. by 14 in.
Steamports	1½ in. and 2½ in. by 7 in.
Front overhang	4 ft. 10½ in.
Rear overhang	6 ft. 10½ in.
Rail to chimney	10 ft.
Boiler	2 ft. 11 in. dia. by 2 ft. 3 in.
Dome	1 ft. 9 in. dia. by 2 ft. 3 in.
Total heating surface	318 sq. ft.
Weight (leading)	9½ tons
,, (trailing)	5 tons 12 cwt.



This G.E.Ry. saddle tank would make a charming little model.



G.E.R. No. 209 *had a flat-topped saddle tank—an unusual feature.*



The six-foot connecting-rod was of typical design but note the bad position of the crosshead pin and the unusual connecting-rod small-end.

Six years after Craven had built the little four-wheeled saddle-tank at Brighton, two locomotives were purchased by the Great Eastern Railway from Messrs. Neilson & Co., Glasgow, which bore, in many ways, a remarkable resemblance to the yellow No. 400. One cannot help feeling that these G.E.R. engines (Nos. 209 and 210) would make charming models, especially if contrasted with one of the L.B. & S.C. Railway design.

Their little 3 ft. 6 in. wheels with cross-section spokes, and shapely 5 ft. 5 in. connecting-rods, looked very pretty indeed when revolving slowly during shunting operations in the various goods yards where they were employed. Just previous to their delivery at Stratford from the North, that fine engineer, William Adams, had taken charge of the locomotives of the G.E.R., but, so far, he had no time to produce any engines of his own design. It is not surprising, therefore, that No. 209 bore some traces of the previous Stratford Chief, the famous Robert Sinclair. The most prominent of these were ; the green paint with black lining, the stove-pipe chimney, with its double beading at the top, and the curious method of suspending the headlamps by their handles, which rested in a kind of spoon-shaped lamp bracket.

The saddle-tanks were flat across the top—an unusual feature, but otherwise many of the details were much like those of the Brighton engine—even including the Ramsbottom type of spring-hangers, as a comparison of the two drawings will show. The cylinders were 12 in. by 20 in. stroke, working at 120 lb. The wheelbase was 5 ft. 10 in. and at the trailing end spread out to no less than 6 ft. 8 in. ! The boiler measured 3 ft. 5 in. diameter, with a length of 8 ft. 8 in., whilst the outside firebox was 3 ft. in length. The engines weighed only 17 tons 3 cwt. in working order, the leading wheels taking 8 tons 3 cwt. of the load.

Well, there they were, the perky little imps, with shining brass safety-valve covers, brass number-plates of Samuel Johnson's design, and slender Sinclair chimneys. Together with L.B. & S.C.R. 400 they formed a trio of most fascinating little " four-wheelers."

And that sets us a-thinking. Why do we really model locomotives ? Is it performance, beauty or personal acquaintance that urges us forward on our delightful task ? Most of my friends firmly allege that, in the long run, it is the two latter qualities that most strongly influence them. What sentimental creatures, luckily, we are ! An old hard-bitten driver, leaning out over the side of the cab of an ancient and decrepit puffer once remarked to me, " Yes, sir, an awful old crock—but some'ow I loves *all* ingines ! ! " Yes, he was right, for unconsciously he had voiced the feelings of every true locomotive modeller. We do indeed love *all* " ingines ! "